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Art Students' Anatomy

by Edmond J. Farris



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ART STUDENTS' ANATOMY

ART STUDENTS' ANATOMY

BY

EDMOND J. FARRIS

SECOND EDITION REVISED

PROFESSOR OF ANATOMY, PENNSYLVANIA ACADEMY OF THE
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158 ILLUSTRATIONS

DRAWINGS BY

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TO MY MOTHER

PREFACE

The purpose of this book is to describe to art students in as simple a manner as possible the essential anatomy of the living body. In the study of anatomy, it is advisable for the student to master: first, the skeleton and its surface projections; second, the muscles and their surface projections; and third, the surface form as affected by various actions. The author hopes to assist the student in accomplishing this chiefly by illustrations, photographs of living models, and roentgenograms. Text is used only to emphasize the importance of illustrations.

Close observation of one's self, as well as of others at work and at play will prove exceedingly beneficial in the mastery of anatomy. When a living model is available, the student should observe most carefully the details of the surface anatomy, and should train himself to do memory sketches of the model using these details as a premise to assist the expression of the artist.

Our great masters of art realized that a thorough understanding of anatomy was a necessary instrument in the portrayal of art, and Leonardo da Vinci, though known as an artist, merits the reputation of a great anatomist by reason of his accurate anatomical sketches and contributions to this subject.

In this book are reproductions of the great work of Siegfried Albinus, an anatomic illustrator of the early 18th century. These muscle and skeleton plates have been described by Dr. Charles Singer "as the most beautiful and among the most accurate anatomical figures ever published." In order to have scientifically correct drawings, numerous figures were drawn from actual bodies, these carefully averaged, and the completed work engraved by Jan Wandelaar under Albinus's direction. Most interesting are the ornaments of his figures which were chosen to give an accurate idea of the proportions of the figures.

The roentgenograms in the nine figures show actual actions of joints, and the bones forming these joints. The detail of bone in these x-rays was avoided purposely by the author in an effort to show greater skin density, and thus, a better understanding of the relationship of the skin to the bones of the joint.

The anatomical terms used throughout the text are in current use today in the majority of anatomical laboratories, and should likewise be adopted by the artists. A glossary of terms, their pronunciations and meanings is given at the end of the book.

The author is indebted to his wife, L. Augusta Stroman Farris for her untiring efforts, care and skill in making all of the illustrations, and for useful advice in all branches of the work. My thanks are due Roy M. Reeve, photographer at the Army Medical Museum, and his staff of assistants, for their very fine cooperation in taking most of the photographs. To Ted Shawn, the author wishes to acknowledge and express appreciation for the use of two photographs. The author appreciates the cooperative assistance of all the persons who so kindly posed for the photographs. Appreciation is also extended Dr. Wilbur Davis for assisting the author in the photography of some of the action pictures in figures 141 and 142, and to Dr. Louis G. Farris, Dr. Felipe Martinez, and John Keohane for valuable criticism.

For the friendly dealings, and excellent cooperation, the author wishes to thank Mr. E. W. Bacon and the publishers, J. B. Lippincott Company.

PREFACE—*Second Edition*

Suggestions to the teacher and student

Various methods are used in art schools for the study of anatomy. In the lectures and work at the Pennsylvania Academy of the Fine Arts, I have endeavored to teach students to develop primarily keener powers of observation, and thus create a clearer insight in understanding the nature of the figures which the artist represents.

We follow closely the order of chapters in the book. We consider the landmarks and proportions very early in the course, for the student is constantly referring to landmarks and proportions in practically all of his work. The skeleton as a whole, the skull, bones and joints are studied in detail. Every student has a set of bones available for drawing purposes and to refer to during the lectures. The lecture is preceded and followed, as a rule, with approximately ten minutes of demonstration and sketching from the model, to emphasize the anatomy considered in the lecture. In the study of the muscular system, not only are the origin, insertion and action of each muscle stated, but the individual shapes of their fleshy and tendonous portions, and their effect on the surface forms are carefully demonstrated, when possible, on the living model.

Besides such visual aids as lantern slides and motion pictures, frequent visits are made to the galleries, to discuss the anatomy in all types of art. At the close of each semester, the students compete for three different prizes: one for the most complete and accurate set of bone drawings, two for the most accurate drawing of a skeleton which is posed, and three for the drawing of the most accurate muscle surface anatomy representation.

We have found that one of the advantages of this book is that the student is able to learn anatomy the easy way, for by referring constantly to the illustrations, one can identify anatomical structures such as muscles, bony landmarks, swellings or the parts of interest without the aid of a teacher.

It is a pleasure to acknowledge my thanks to a former student, Frank Stepler, for figures 144 and 145, and other anatomy students at the Pennsylvania Academy of the Fine Arts for samples of class work.

The Wistar Institute of
Anatomy and Biology

EDMOND J. FARRIS

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ART STUDENTS' ANATOMY

INTRODUCTION TO ANATOMY

Human Anatomy is the study of the architecture of the human body. The body is composed of several systems of organs as follows:

1. The **skeletal system**; or study of bones is known as **osteology**.
2. The **articulatory system**; or study of joints and ligaments is known as **arthrology**.
3. The **muscular system**; or study of muscles is known as **myology**.
4. The **nervous system**; or study of the brain and the spinal cord is known as **neurology**.
5. The **blood system**; or study of the lymph-vessels, heart, and blood vessels is known as **angiology**.
6. The **integumentary system**; or the study of skin, hair, nails, etc. is known as **dermatology**.
7. The **respiratory system** consists of the lungs, larynx, and windpipe.
8. The **digestive system** includes the alimentary canal and its accessory parts such as teeth, tongue, etc.
9. The **urogenital system** consists of the urinary and reproductive organs.

DESCRIPTIVE TERMS

In anatomical description, the following terms are in common use.

Anterior or **ventral** refers to the front of the body.

Posterior or **dorsal** refers to the rear or back of the body.

Superior or **cranial** refers to the head-end or upper-end of the body.

Inferior or **caudal** refers to the lower-end of the body.

Medial means nearer the midline of the body.

Lateral means farther from the midline of the body.

Internal means deeper or towards the center of the part.

External means towards the outside.

The terms **proximal** and **distal** are used only in description of the limbs.

Proximal means nearer the point of attachment or trunk, while **distal** means farther from the point of attachment.

The **anatomical position**, or the position in which the body is usually described, is one in which the individual stands erect, with arms at the side, and the palms of the hands facing forward.

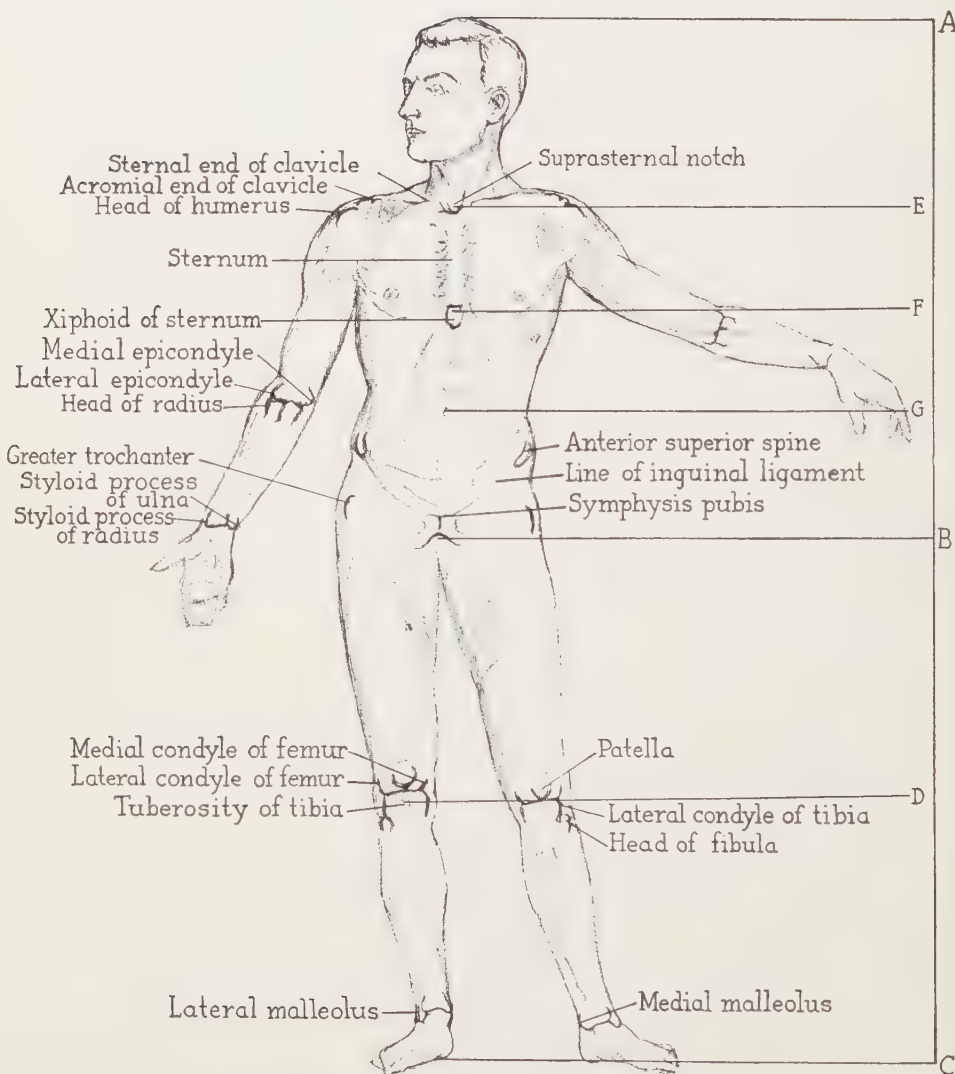


FIG. 1.—Anterior surface view showing landmarks and proportions.

CHAPTER I

LANDMARKS AND PROPORTIONS

There are landmarks evident in various regions of the body essentially important to the artist. These landmarks, as indicated in the figure on the opposite page, deal primarily with bones which cause projections on the surface. The details concerning the landmarks will be considered later in the text.

The human body is composed of the following parts:

The head (caput) includes the **SKULL** (cranium) and the **FACE** (facies). The face includes the mouth (os), nose (nasus), and eye (oculus).

The neck (collum) joins the head with the trunk. The sternocleidomastoid muscles, the throat (larynx), and the sternal parts of the clavicles are easily visible.

The trunk (truncus) is divided into the **CHEST** (thorax) and **BELLY** (abdomen). On the chest, one can distinguish the rib outline, the nipples of the mammary glands, and the lower border of the sternum, which serves as a line of separation between the thorax and abdomen. On the abdomen, the navel (umbilicus) is recognized as a depression at approximately the mid-abdomen. The inguinal ligament separates the trunk from the lower extremity. The **BACK** (dorsum) from the neck to the hip bones (coxae) is usually considered the hinder or posterior part of the trunk. The back of the neck is known as the nape (nucha).

The upper extremity (extremitas superior) is divided into four portions: **SHOULDER** (omos), **ARM** (brachium), **FOREARM** (antibrachium), and the **HAND** (manus), which includes the wrist (carpus).

The lower extremity (extremitas inferior) is also divided into four parts: **HIP** (coxa), **THIGH** (femur), **LEG** (crus), and **FOOT** (pes), which includes the ankle (tarsus).

PROPORTIONS IN THE ADULT MALE

The "head-length" is the usual unit of measurement.

The average body is $7\frac{1}{2}$ heads in length.

The shoulders at the greatest width, measures about 2 head-lengths.

The supra-sternal fossa to the tip of the middle finger measures $\frac{1}{2}$ the height of the body.

The body may be divided into two equal halves as in the diagram.

AB = BC where B represents the pubic arch.

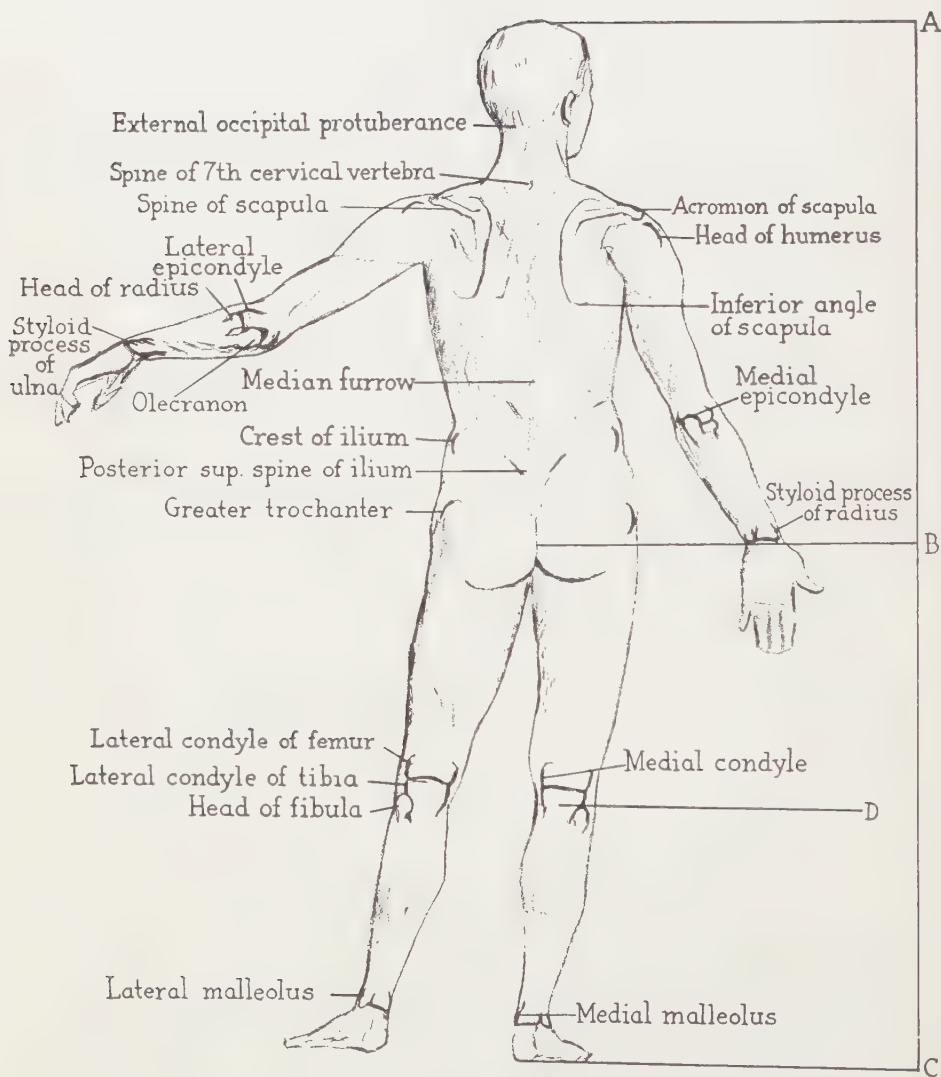


FIG. 2.—Posterior surface view showing landmarks and proportions.

The **lower half** (BC) may be subdivided into two equal halves:
 $BD = DC$ where D represents a point just below the knee.

The **trunk** (Fig. 1) may be divided into equal thirds as follows:
 $EF = FG = GB$ where E is the supra-sternal fossa
 F is the xiphoid process of sternum
 G is the navel
 B is the pubic arch.

PROPORTIONS IN THE ADULT FEMALE

The body is $7\frac{1}{2}$ head-lengths. The trunk is slightly greater in length than that of the male, while the length of the lower limbs is slightly shorter. The pelvis is broader in the female, while the width of the shoulders is narrower.

PROPORTIONS IN THE INFANT

The proportions of the infant may be represented in head-lengths as follows:

Birth—1st year	4 head-lengths
4 years	5 head-lengths
9 years	6 head-lengths (see page 125)
15 years	7 head-lengths
(Adult)	$7\frac{1}{2}$ head-lengths)

CHAPTER II

THE SKELETON AS A WHOLE

The skeleton forms the framework of the body. It includes bones, cartilages, and articulations which bind the bones together.

Functions of Bones.

1. To afford surface for attachment of muscles.
2. To afford protection.
3. To serve as levers.
4. To bear weight.

Shape of Bones. The bones, according to their shapes, are divided into four types:

1. Long bone—Example, humerus.
2. Short bone—Example, wrist bones.
3. Flat bone—Example, scapula.
4. Irregular—Example, vertebra.

Sex of Bones. The male bones are characterized by:

1. Greater development of processes and ridges.
2. Greater broadness.
3. Greater size of the articular surfaces.

Number of Bones. It is impossible to state an exact number of bones for skeletons in general. No two skeletons are identical. However, two hundred separate bones (206) is the usual number of bones, of which one hundred and twenty-six belong to the appendicular skeleton, and seventy-four to the axial skeleton.

Parts of Bones.

Canal—a tunnel.

Condyle—a rounded eminence with articular cartilage.

Crest—a sharp border of bone.

Epicondyle—a projection above a smooth articular surface.

Foramen—a hole.

Fossa—a depression.

Incisure—a notch.

Lip—margin of a groove.

Line—a low ridge.

Plane—a flat surface.

Process—any kind of projection.

Sinus—a cavity in bone with mucous membrane lining.

Spine—a sharp prominence.

Sulcus—a groove.

Trochlea—a pulley.

Tuberosity—a rounded eminence.

THE SKELETON OUTLINED

The skeleton may be outlined as follows:

AXIAL: Skull, Vertebrae, Sternum, Ribs, Hyoid bone.

APPENDICULAR: Superior extremity, Inferior extremity.

Axial	(Single bones)	(Paired bones)
SKULL:	frontal ethmoid sphenoid vomer mandible occipital (hyoid)	parietal temporal zygoma (malar) nasal maxilla palate lachrymal turbinate
VERTEBRAE:	cervical 7 thoracic 12 lumbar 5 sacrum 5 (Fuse to form one bone in adult) coccyx 3 to 4 (Fuse to form one bone in adult)	
STERNUM:	manubrium body xiphoid process	
RIBS:	(Paired bones) true ribs 14 false ribs 10	

Appendicular (Appendicular skeleton is paired throughout)

SUPERIOR EXTREMITY:

clavicle or collar-bone
scapula or shoulder-bone
humerus or arm bone
radius } forearm
ulna }
carpal or wrist bones (8)
metacarpal or palm bones (5)
phalanges or finger bones (14)

INFERIOR EXTREMITY:

innominatum or hip bone
ilium
ischium
pubis
femur
tibia } leg
fibula }
patella or knee-cap
tarsal bones (7)
metatarsal bones (5)
phalanges or toes (14)

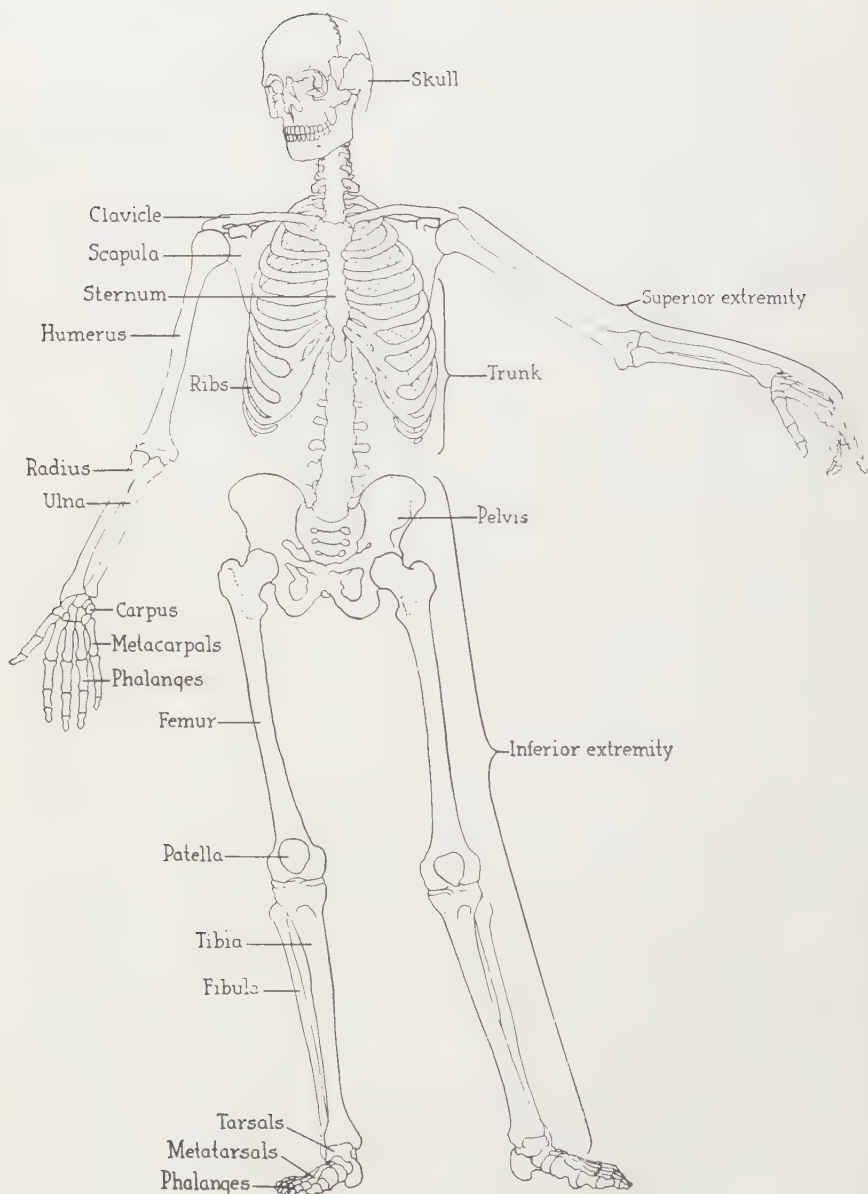


FIG. 3.—Skeleton, anterior view with labeled leaders.



FIG. 4.—Skeleton, anterior view (Albinus).

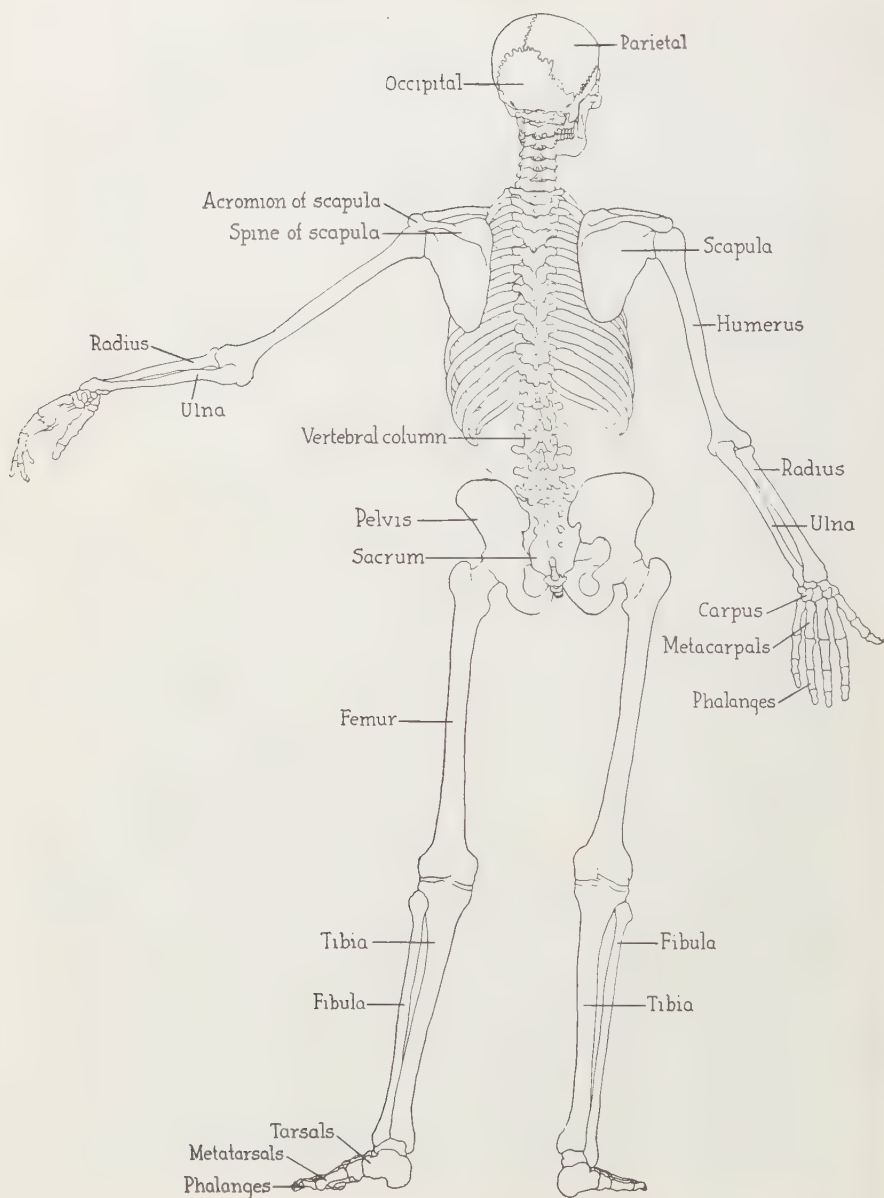


FIG. 5.—Skeleton, posterior view with labeled leaders.

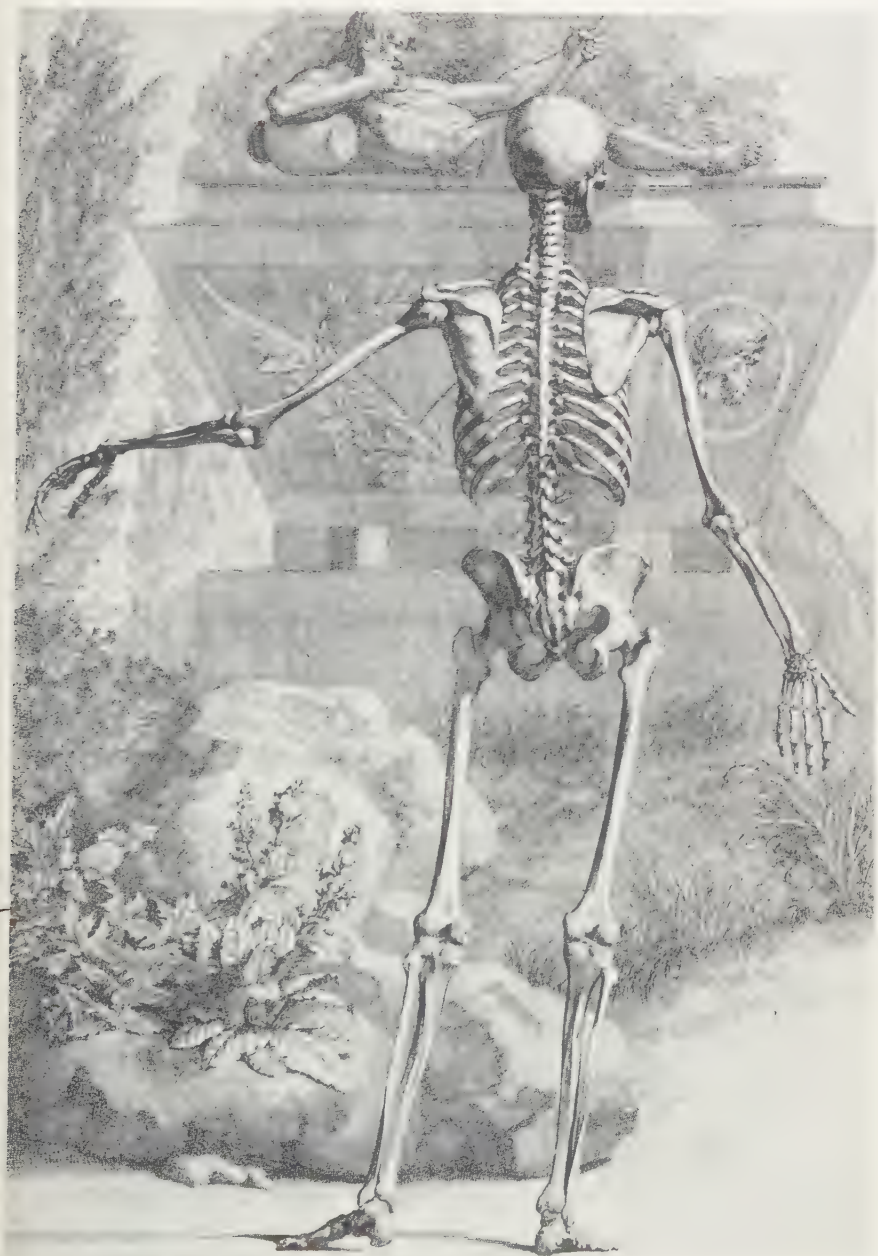


FIG. 6.—Skeleton, posterior view (Albinus).

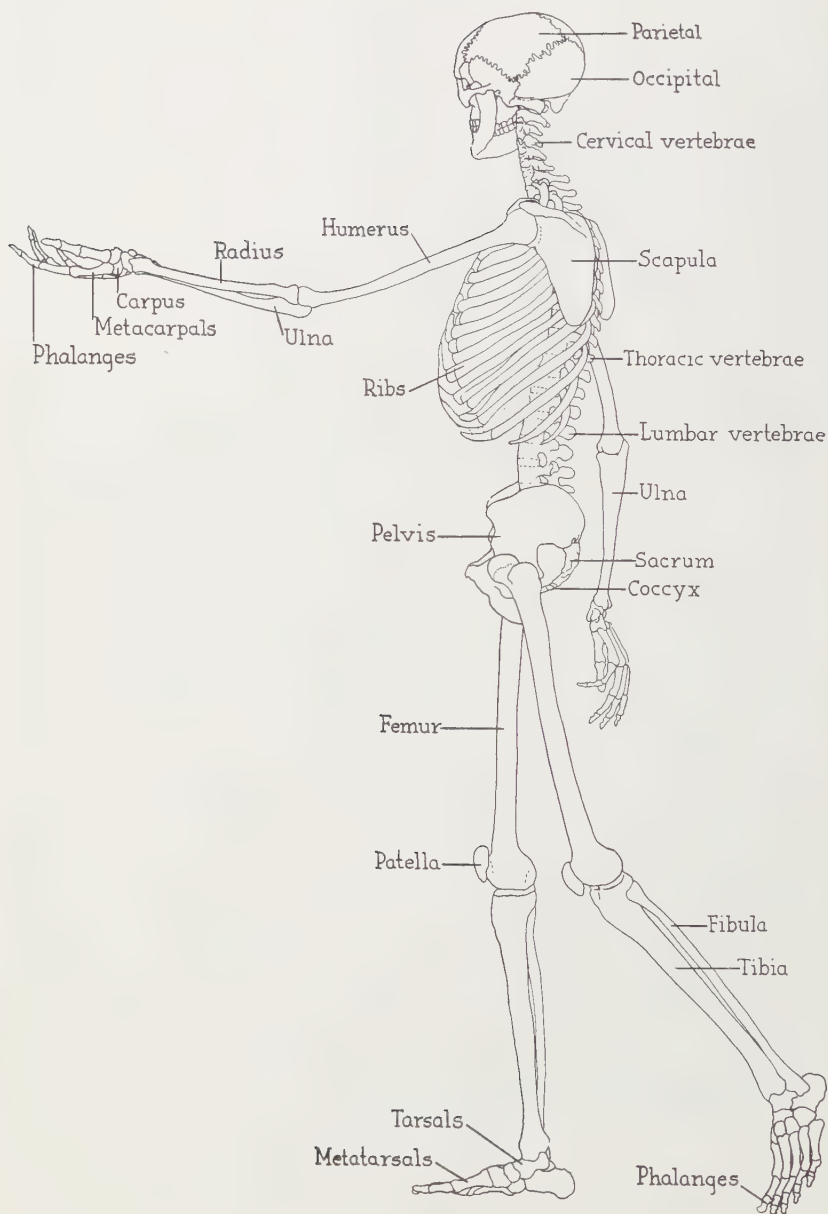


FIG. 7.—Skeleton, viewed from the left with labeled leaders.

THE SKELETON AS A WHOLE

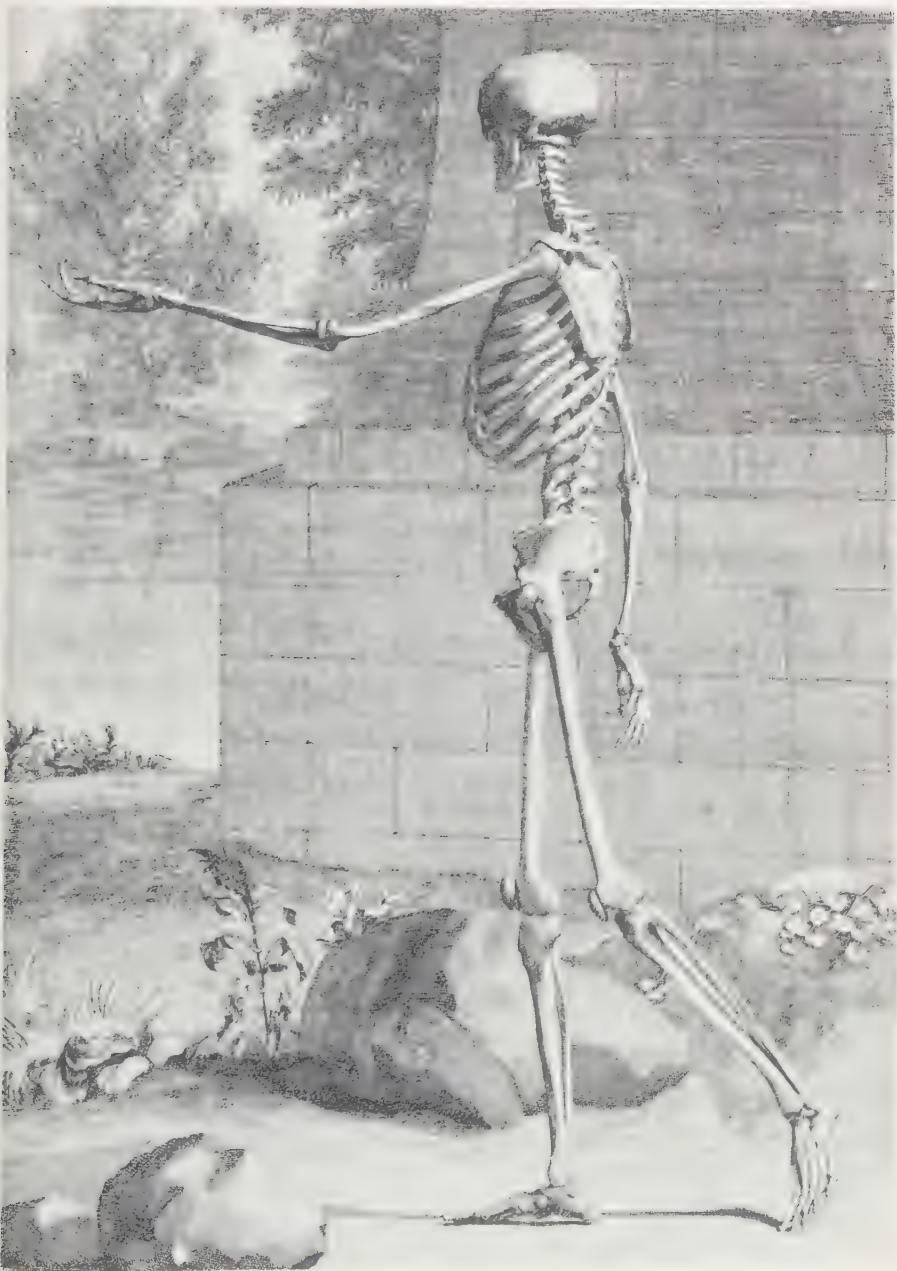


FIG. 8.—Skeleton, viewed from the left (Albinus).

CHAPTER III

THE SKELETAL SYSTEM

THE SKULL

The skull (Figs. 9, 10, 11) rests on the summit of the vertebral column. The individual bones composing the skull are joined to each other by sutures. The skull may be divided into two parts as follows: (1) the **skeleton of the face**, and (2) the **cranium**, in which the brain is lodged.

SKELETON OF FACE (14)

Two maxillae
Two nasals
Two zygomatics
Two lacrimals
Two palatines
Two inferior nasal conchae
Vomer
Mandible

CRANIUM (8)

Two parietals
Two temporals
Frontal
Occipital
Sphenoidal
Ethmoidal

The frontal bone forms the forehead, roof of the orbits, and the nasal fossae. It is smooth and subcutaneous, so that the shape of the bone is distinctive. The internal surface of the bone lodges the frontal lobe of the brain which is associated chiefly with the intellect. The frontal eminences are usually more prominent in women and children than in men, and appear as swellings on either side of the forehead. Below the frontal eminences are the superciliary arches which are small in the female and absent in children.

The occipital bone forms the back of the head. The **large foramen** (foramen magnum) on the base allows transmission of the spinal cord to the cranial cavity. The **external occipital protuberance** is easily felt as a prominent surface posteriorly. From the protuberance there extends laterally on either side a curved ridge of bone for muscle attachments, termed **superior nuchal line**.

The parietal bones are quadrilateral in shape and are united together in the mid-line by the sagittal suture to form the vault of the cranium.

The temporal bones are below the parietal bones at the side and base of the skull. Each possesses a nipple-like projection (the mastoid process), and a deep canal (the external auditory meatus of hearing). The mastoid process is not well developed in the infant, accounting for the marked flattening in appearance. (Fig. 144)

The maxillary bones are fused to form the whole upper jaw. Each maxilla assists in forming the roof of the mouth, the floor and lateral wall of the nose, and the floor of the orbits. It lodges the upper teeth, which in the adult consist of permanent teeth. The first set of teeth appear in childhood, and are called deciduous or milk teeth.

The dental formulae may be represented as follows (Figs. 9, 10, 11, 144):

	Molar	Premolar	Canine	Incisor	Incisor	Canine	Premolar	Molar
Permanent	3	2	1	2	2	1	2	3
Deciduous		2	1	2	2	1	2	

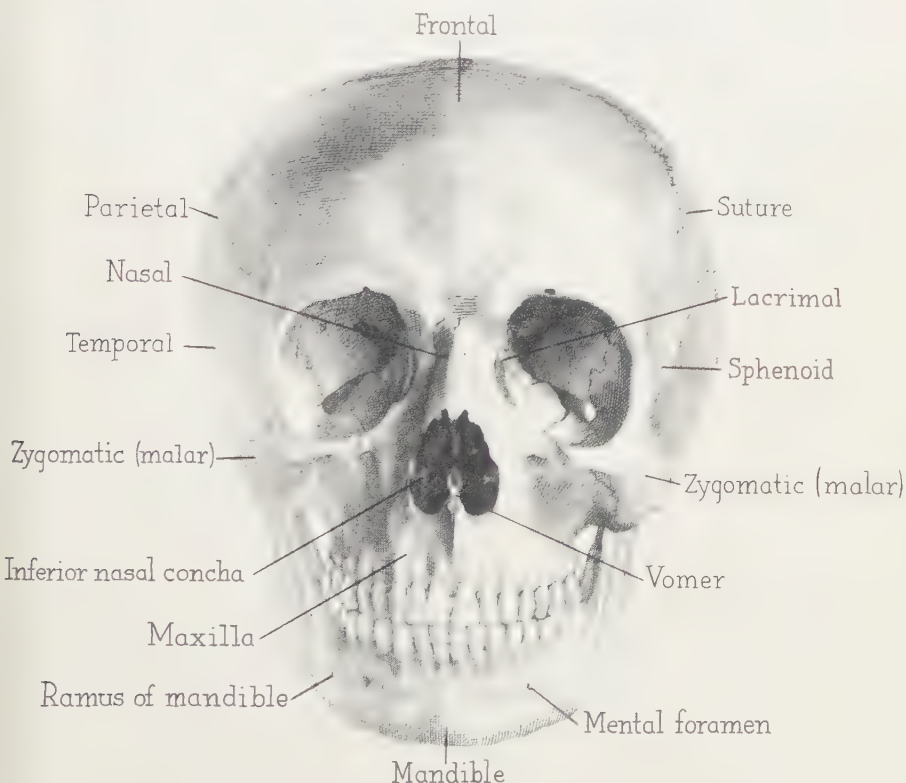
The mandible is the largest and strongest bone of the face. It consists of a horizontal body and two perpendicular parts, the rami, which unite with the ends of the body in the adult at nearly right angles. It lodges the lower teeth and has a dental formula identical to the upper jaw. The mandible articulates with the temporal bone.

The zygomatic bones are small and quadrangular in shape and are situated at the upper part of the face to form the distinct prominences of the cheeks.

The two nasal bones form the bony arch or "the bridge" of the nose by being placed side by side at the middle and upper part of the face.

The sinuses are large air spaces in the frontal, ethmoid, sphenoid, and maxillary bones. They all communicate with the nasal passages.

Differences in skull due to age—see page 149.



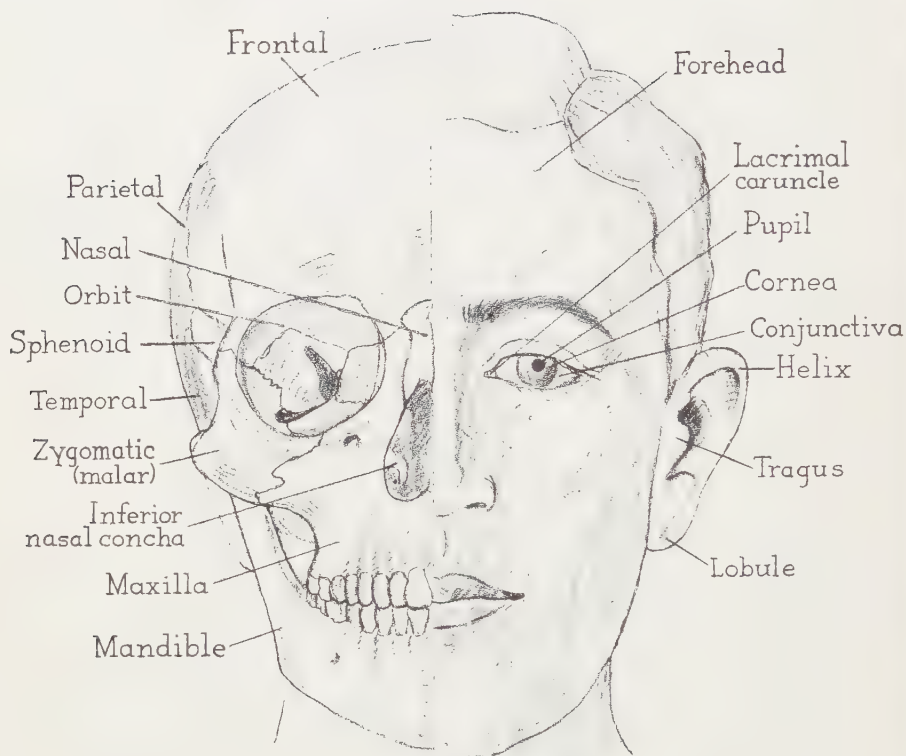


FIG. 10.—Skull from in front, showing surface relationships.

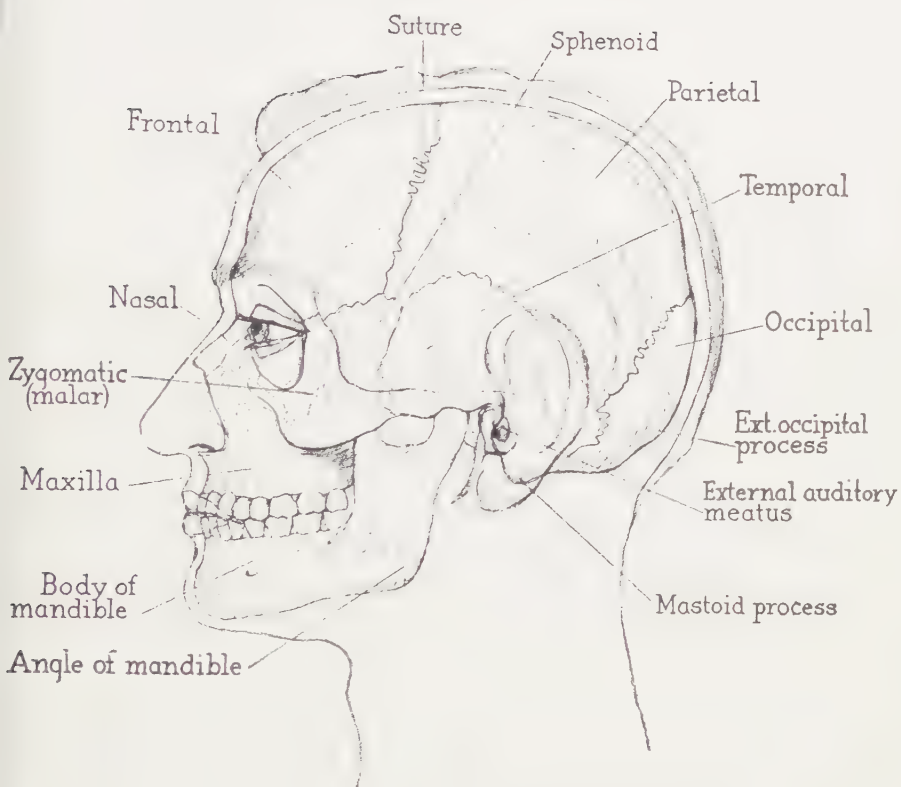


FIG. 11.—Skull from the left side, showing surface relationships.

THE VERTEBRAL COLUMN

The **vertebral column** forms the central axis of the skeleton. It is made up of twenty-six vertebrae in the adult as follows:

Cervical	7
Thoracic	12
Lumbar	5
Sacral	1
Coccygeal	1

The Spine. The spinal column is the chief support for the head, the ribs, the upper and lower extremities. The average length of the spine is about 28 inches in the male, and 27 inches in the female. The **true or movable part** of the spine is made up of the cervical, thoracic, and lumbar portions. The false or fixed part is made up of the sacrum and the coccyx. Spines of all vertebrae incline downwards, a condition peculiar to men and anthropoid apes. The greatest inclination is in the thoracic and least downward inclination is in the lumbar portions.

Curvatures. The vertebral column presents a series of curvatures as follows:

PRIMARY CURVES: THORACIC, convex dorsally, SACRAL, convex dorsally.

SECONDARY CURVES: CERVICAL, concave dorsally, LUMBAR, concave dorsally.

The thoracic and sacral curves are termed **Primary** because they are present in fetal life. The cervical and lumbar curves are **Secondary**, and are developed after birth at about three and one-half months, when the child holds up his head; at nine months, when the child sits upright; and at about twelve to eighteen months, when the child begins to walk.

BONY LANDMARKS

The **spines** of the vertebrae are subcutaneous. The **seventh cervical or vertebra prominens** is the most prominent in the **cervical region**. The **first thoracic spine** may appear more prominent than the seventh cervical. On stooping or bending, the **thoracic vertebrae** appear like beaded elevations.

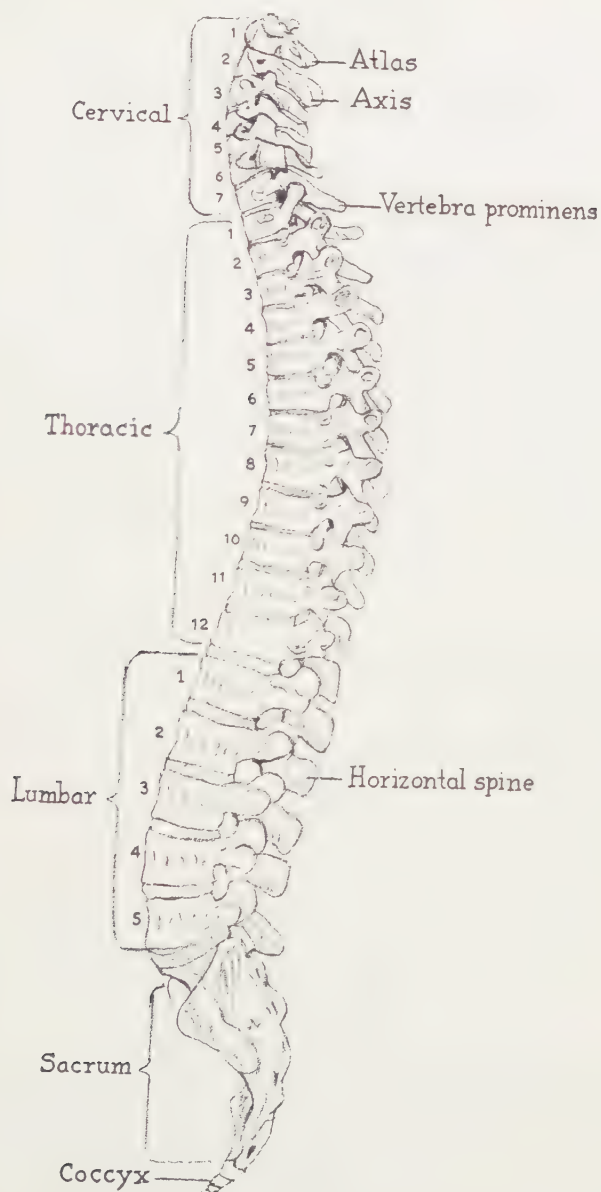


FIG. 12.—Vertebral column, from the left side.

CLAVICLE

Shape. Slender, double curved, rounded medially, flattened laterally.

Position. Ventrally at base of neck and beginning of shoulder.

Articulations. Sternum, indirectly medially, acromion laterally.

Divisions. Body, sternal extremity, acromial extremity.

BONY LANDMARKS

The clavicle is subcutaneous throughout, being visible in most people, and easily felt through the skin and fascia. The sternal extremity is always visible.

STERNUM

Shape. Elongated, flattened ventro-dorsally, Roman sword-like.

Position. Thorax (chest), ventro-medially.

Articulations. Clavicle and true ribs.

Divisions. Manubrium (handle), body (little sword), xiphoid process.

BONY LANDMARKS

The middle of the sternum is subcutaneous. The female sternum is shorter and perhaps somewhat broader than that of the male.

THORAX

(Figures 4, 6, 8)

Shape. Barrel like, but smaller at upper than at lower portion.

Comprises. 12 thoracic vertebrae

12 ribs and cartilages

1 sternum (breast bone), which by their articulations make the barrel-shaped cavity. The slope of ribs increases from above downwards.

The antero-posterior flattening is a purely human characteristic.

The upper seven ribs are called **true ribs** because they are attached to the sternum. The lower five ribs are called **false ribs** because they are not attached directly to the sternum, but by cartilage to the sternum. The eleventh and twelfth ribs are called **floating ribs** because they are free of cartilage. The thorax of the female is shorter than that of the male. Although the thorax is well covered externally with muscles, excepting the middle of the sternum and the mid-line of the back, the outline of the thorax is evident for the most part.

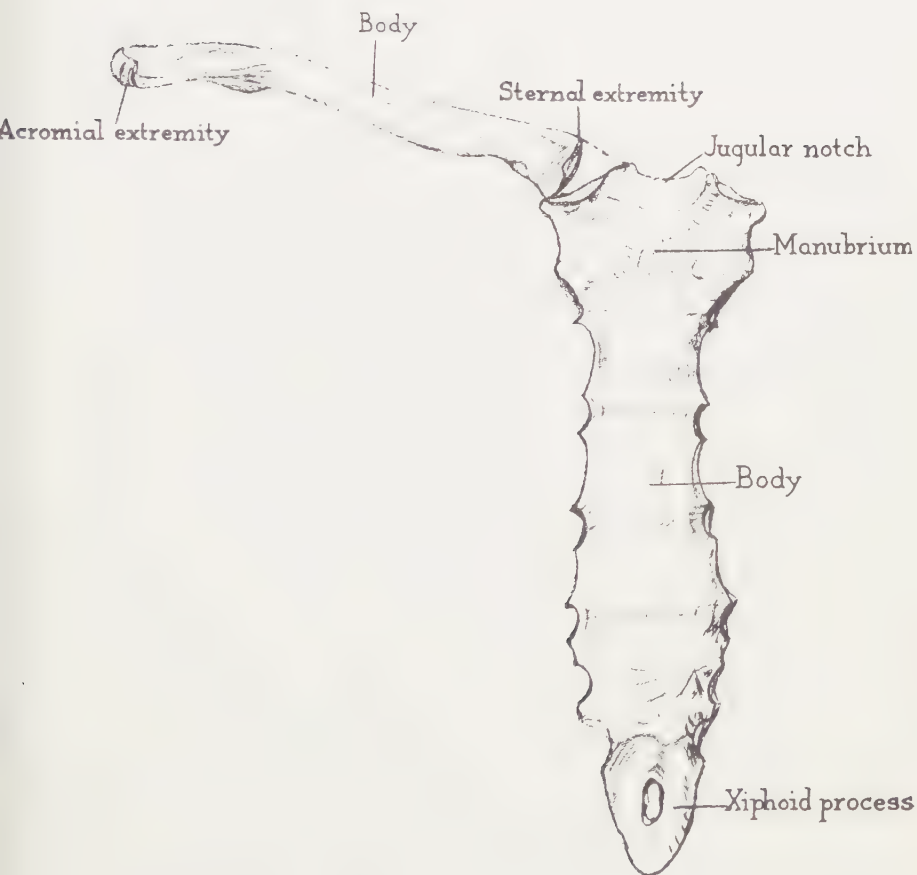


FIG. 13.—Clavicle and sternum, from in front.

SCAPULA

Shape. Broad, flat, triangular with prominent transverse ridge on posterior side.

Position. Thorax, dorso-laterally from 2nd to 7th rib.

Articulations. Clavicle proximally, humerus distally.

Divisions. Body, spine, coracoid process, acromion.

BONY LANDMARKS

The bony points which can be felt on the scapula are the **acromion**, **spine**, **coracoid process**, the **vertebral border**, and the **inferior angle**.

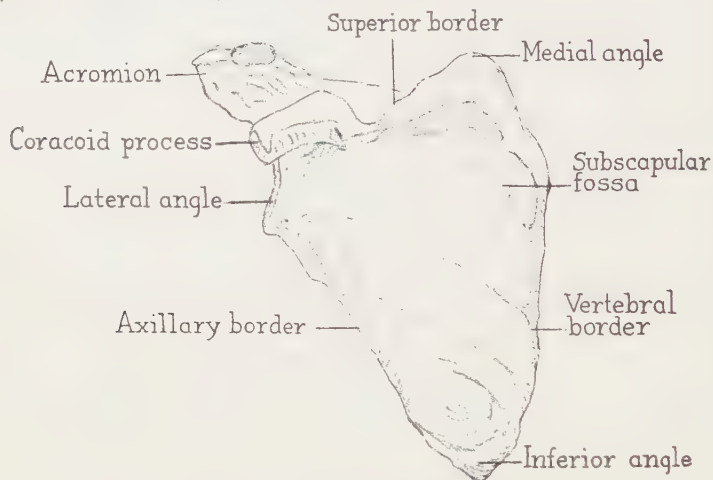


FIG. 14.—Right shoulder blade, scapula, from in front.

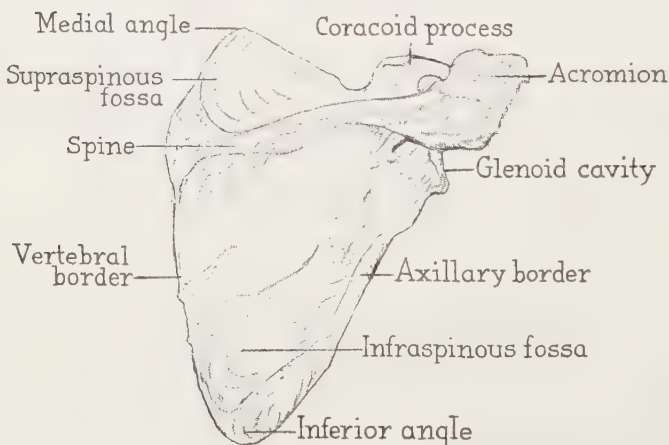


FIG. 15.—Right shoulder blade, scapula, from behind.

HUMERUS

Shape. Long, more or less round in upper half, triangular in lower half.

Position. Upper arm.

Articulations. Scapula, proximally; ulna and radius, distally.

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The **medial** and **lateral epicondyles** of the humerus are subcutaneous and easily recognized. The rest of the bone is covered with muscles, although a great part of it can be felt through them.

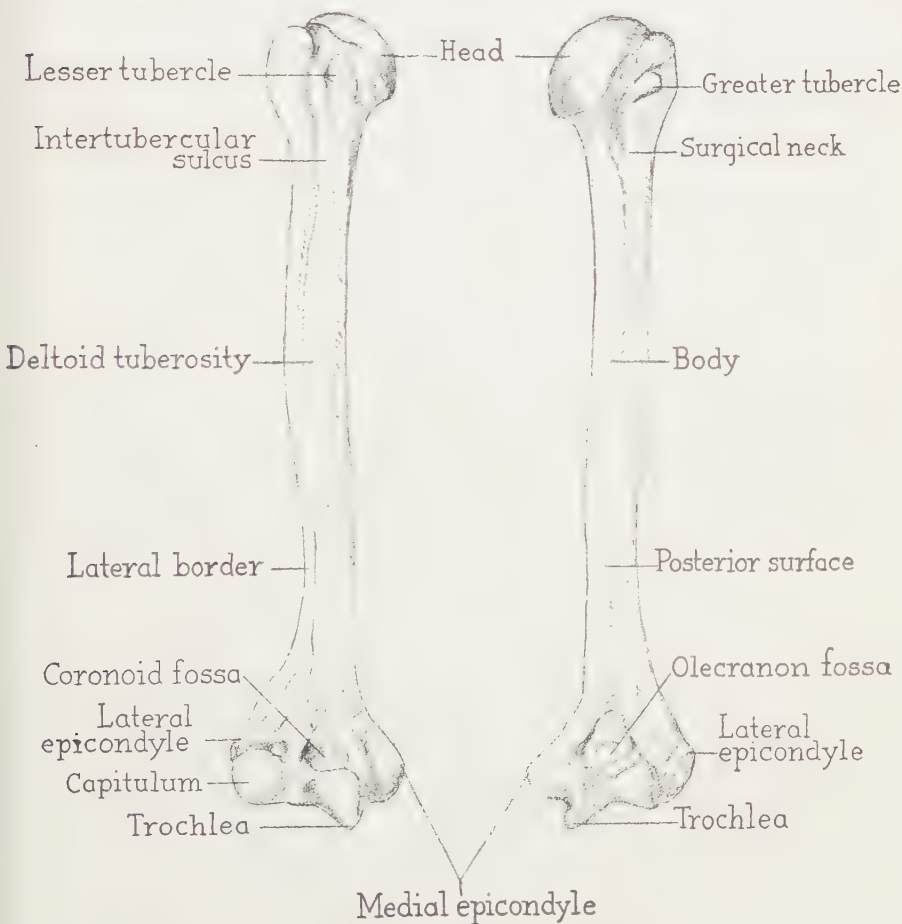


FIG. 16.—Right humerus, anterior view.

FIG. 17.—Right humerus, posterior view.

RADIUS AND ULNA

RADIUS

Shape. Long, slightly curved, rounded proximally, becoming larger distally and somewhat oval.

Position. **LATERALLY** in forearm.

Articulations. Humerus proximally, ulna proximo-medially, ulna disto-medially, navicular and lunate bones of wrist distally.

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The **head** of the radius is visible on the back of the forearm, while the distal extremity (**styloid process**) is somewhat prominent and very easily felt just above the wrist.

ULNA

Shape. Long, tapering, triangular proximally, rounded distally.

Position. **MEDIAL** side of forearm.

Articulations. Humerus proximally, radius proximally and laterally, radius distally and laterally, triangular cartilage distally.

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The **head** of the ulna appears as a rounded knob when the forearm is in the prone (palm down) position. The knob disappears in supination (palm up). The **styloid process** of the ulna is about one-half inch more proximal than the styloid process of the **radius**. The ulna may be felt from end to end on the back of the forearm, the olecranon being subcutaneous, prominent, and visible.

FIG. 18

FIG. 19

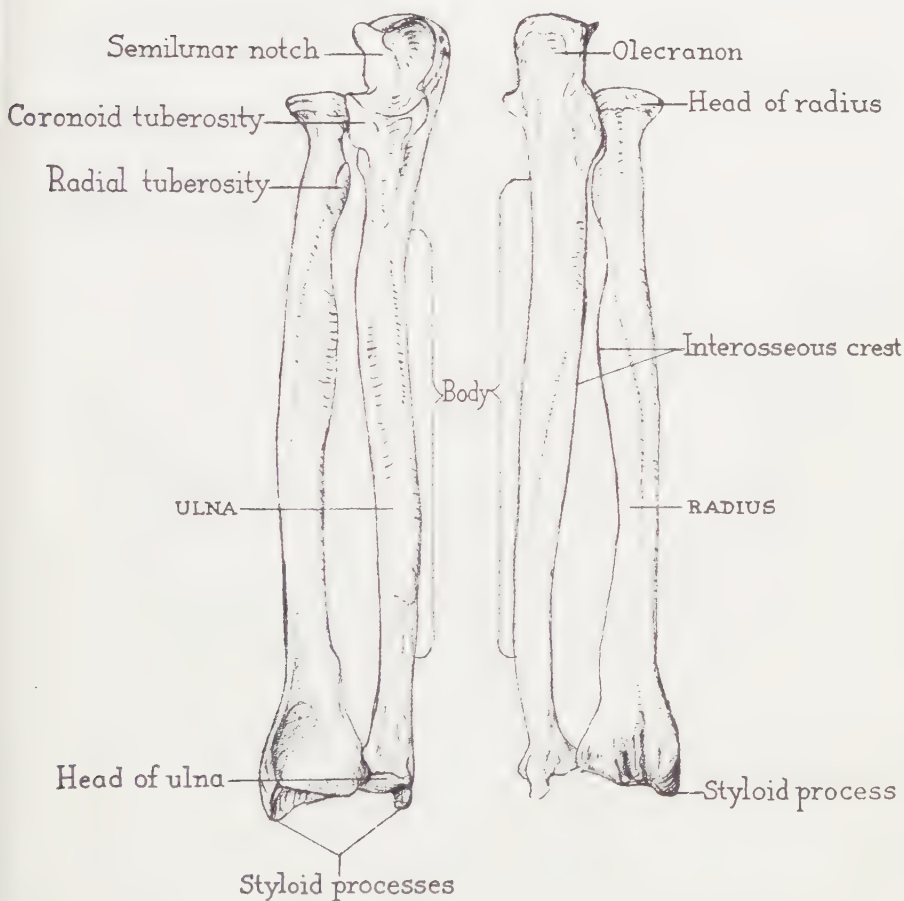


FIG. 18.—Bones of right forearm, radius and ulna, anterior view.

FIG. 19.—Bones of right forearm, radius and ulna, posterior view.

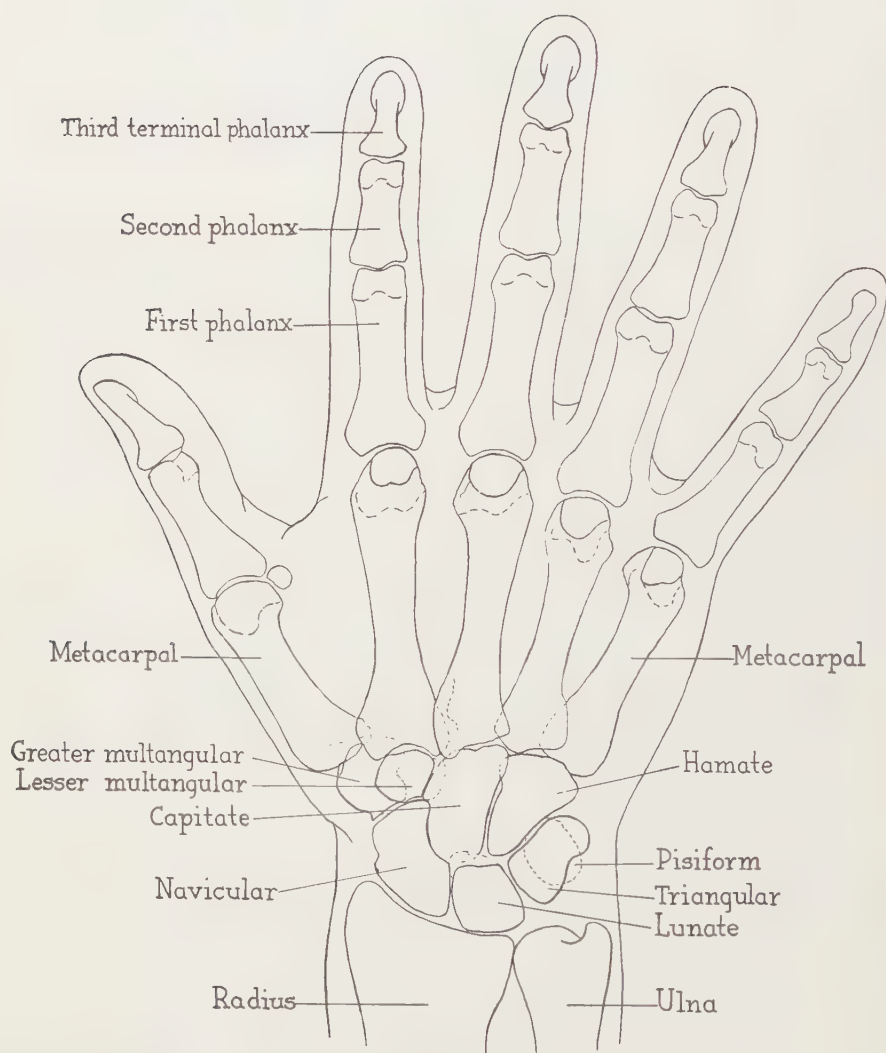


FIG. 20.—Tracing of roentgenogram of right hand, posterior view, showing bones labeled.



FIG. 21.—Roentgenogram of right hand, posterior view, showing bones.

PELVIS

(Figures 4, 6, 8, 22, 23)

Shape. Basin-like.

Position. Lower portion of trunk.

Comprises. Two hip-bones, the sacrum, and coccyx.

Differences in Sex. The male and female pelvis differ greatly, because the latter is arranged for the function of child-bearing.

MALE

Bones stronger and heavier

Superior aperture heart-shaped

Minor pelvis deeper and narrower

Pubic arch pointed and narrow (60°)

FEMALE

Bones lighter

Superior aperture oval

Minor pelvis shallower and wider

Pubic arch rounded and wider (90°)

BONY LANDMARKS

The **anterior superior spine** is prominent in thin people, sometimes as a depression. The **iliac crest** is much more evident in front than behind, but can be felt throughout. The **posterior superior spine** (Fig. 49) forms the dimple evident usually in the female.

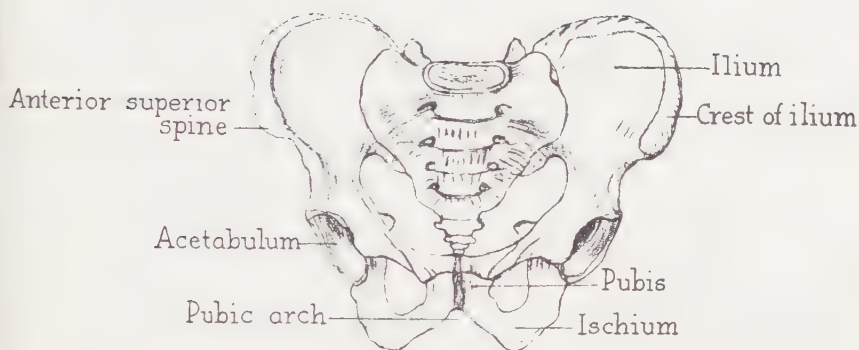


FIG. 22.—Male pelvis, anterior view.

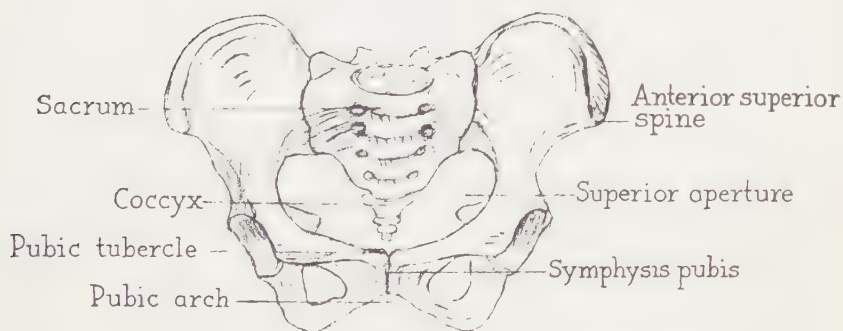


FIG. 23.—Female pelvis, anterior view.

FEMUR AND PATELLA

FEMUR

Shape. Long, large, rounded, slightly curved.

Position. Thigh.

Articulations. Pelvis proximally; tibia and patella, distally.

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The location of the greater trochanter is visible on the lateral surface of the hip. The lateral and medial epicondyles are both superficial.

PATELLA (Figures 4, 8)

Shape. Somewhat like a chestnut.

Position. Knee joint.

Division. Body.

BONY LANDMARKS

The form of the patella is visible under the skin and can be moved from side to side when the leg is extended and relaxed.

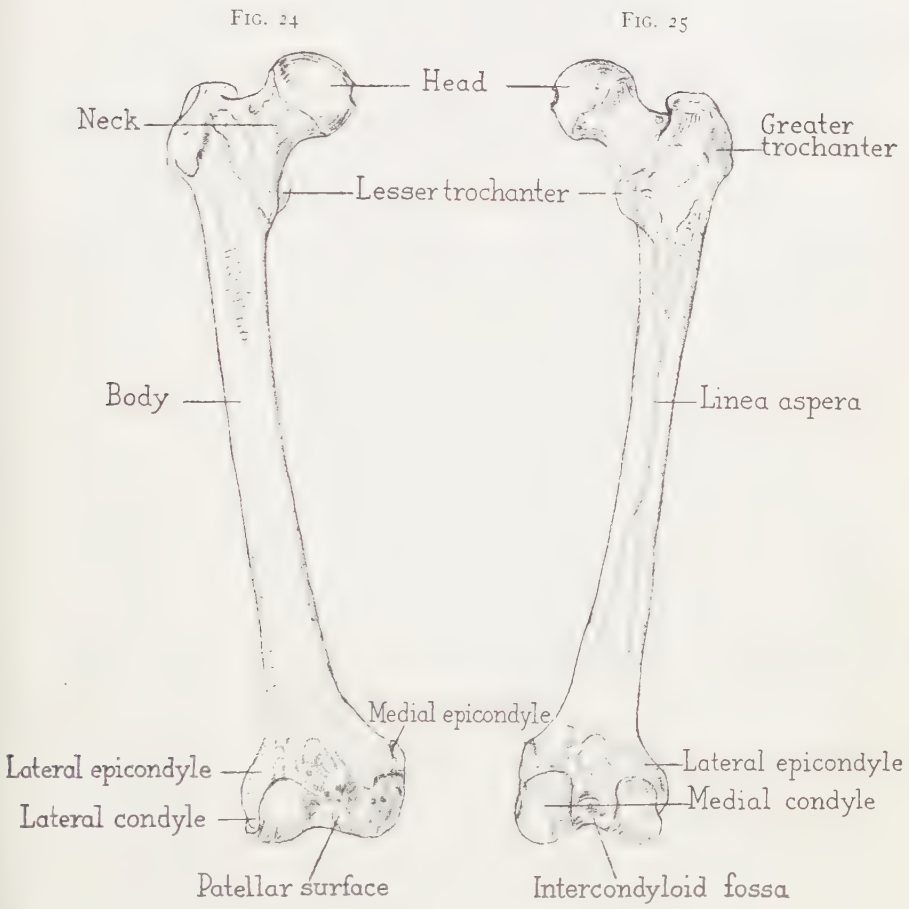


FIG. 24.—Right thigh bone, femur, anterior view.

FIG. 25.—Right thigh bone, femur, posterior view.

TIBIA AND FIBULA

TIBIA

Shape. Long, somewhat triangular, trumpet shaped.

Position. Medial side of leg.

Articulations. Femur proximally; fibula proximolaterally, talus and fibula distally;

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The medial surface of the tibia is subcutaneous and easily felt from proximal to distal ends. The tuberosity serves well as a landmark. The medial malleolus is also subcutaneous and visible, being noticeably higher than the malleolus of the fibula.

FIBULA

Shape. Long, slender, roughly or irregularly four sided.

Position. Lateral side of leg.

Articulations. Tibia, proximally; tibia and talus distomedially.

Divisions. Body, proximal extremity, distal extremity.

BONY LANDMARKS

The head of the fibula is seen as a bony prominence on the postero-lateral surface of the leg. Its distal quarter, including the lateral malleolus, is subcutaneous, the latter forming a somewhat triangular projection at the ankle.

FIG. 26

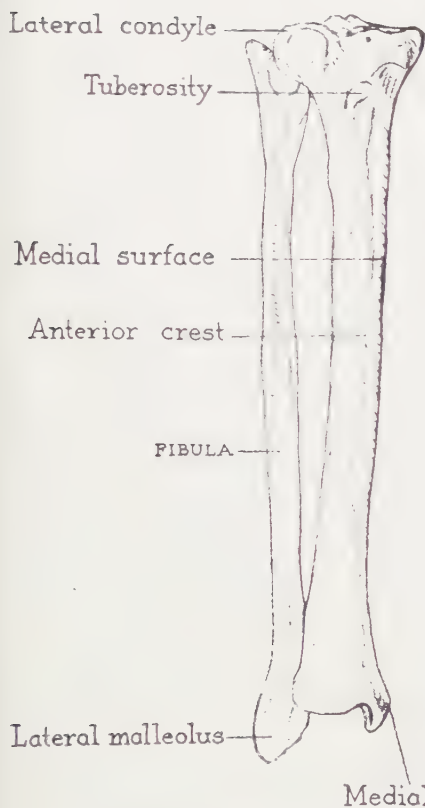


FIG. 27

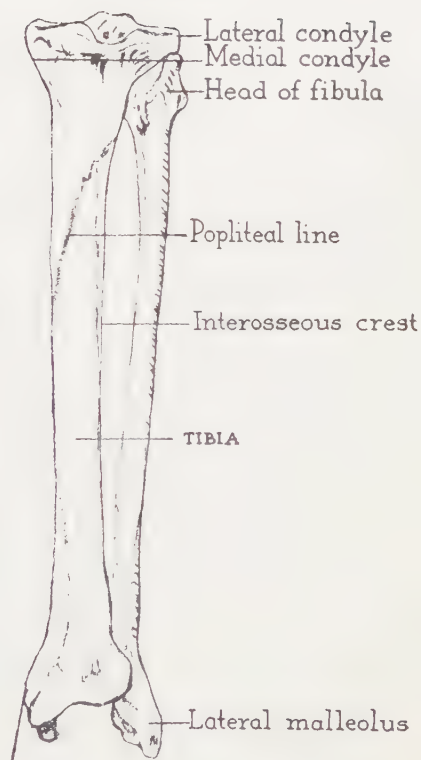


FIG. 26.—Right shin bone and calf bone, tibia and fibula, anterior view.

FIG. 27.—Right shin bone and calf bone, tibia and fibula, posterior view.



FIG. 28.—Labeled tracing of roentgenogram of right foot, from inside, showing bones of foot.



FIG. 29.—Roentgenogram of right foot, from inside, showing bones of foot.

CHAPTER IV

ARTICULATIONS AND MOVEMENTS

Articulations or joints are divided into three classes on the basis of possible movement.

1. Synarthrosis or **immovable**. Example: skull bones.
2. Amphiarthrosis, or **slightly movable**. Example: symphysis pubis.
3. Diarthrosis, or **freely movable**. Example: shoulder joint.

Typical Joint (Fig. 30). The freely movable joint includes the greater number of the joints important to the artist. This type of joint consists of:

1. **CAPSULE**, a continuous sheath of fibrous tissue which envelops the articulating bones.

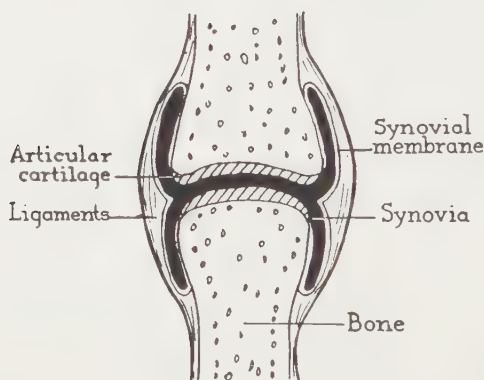


FIG. 30.—Diagram of a typical movable joint.

2. **SYNOVIAL MEMBRANE**, the inner lining of epithelial tissue which secretes a lubricating fluid.
3. **SYNOVIA**, a thick fluid enclosed in the joint capsule.
4. **LIGAMENTS**, thickened, tough, fibrous tissue outside the capsule where greater strain occurs.
5. **ARTICULAR CARTILAGE**, a cartilaginous surface which imparts smoothness.

MOVEMENT IN JOINTS

The movements in joints may be divided into four kinds as follows:

1. **Gliding**: one surface moving over another. Example: Carpal bones.
2. **Angular**:
 - a. Movement away from median plane is called **abduction**.
 - b. Movement toward the median plane is called **adduction**.
 - c. Movement which increases the angle between the parts is called **extension**.
 - d. Movement which decreases the angle between the parts is called **flexion**.
3. **Circumduction**: a succession of movements in which the part describes the surface of a cone, the apex of which is at the articulation.
4. **Rotation**: a movement around a central axis without any displacement from this axis.

SPECIAL MOVEMENTS

Of the Forearm—Supination, a movement which turns the forearm with palm upward.

Pronation, a movement which turns the forearm with the back of hand forward.

Of the Ankle Joint—Inversion, a movement which turns sole of foot inward.

Eversion, a movement which turns sole of foot outward.

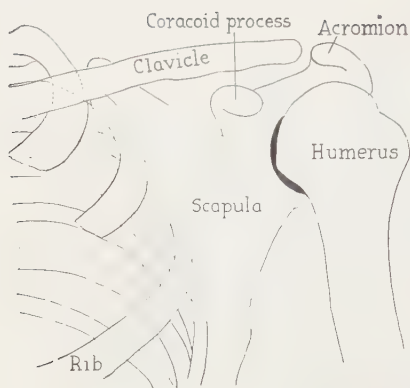


FIG. 31

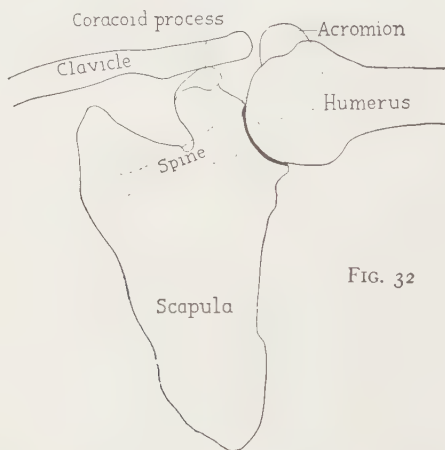


FIG. 32

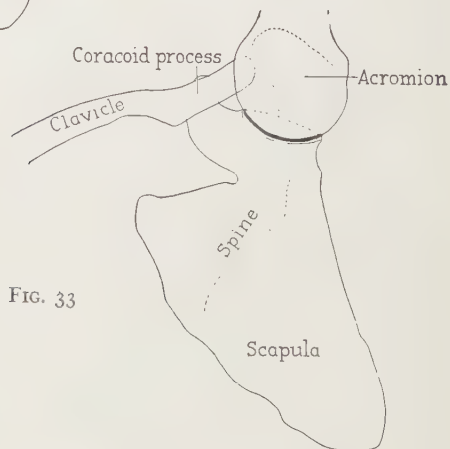


FIG. 33

FIGS. 31, 32, and 33.—Labeled tracings of roentgenograms to show rotation of the scapula.



FIG. 34.—Roentgenogram of left shoulder, arm to side, front view.

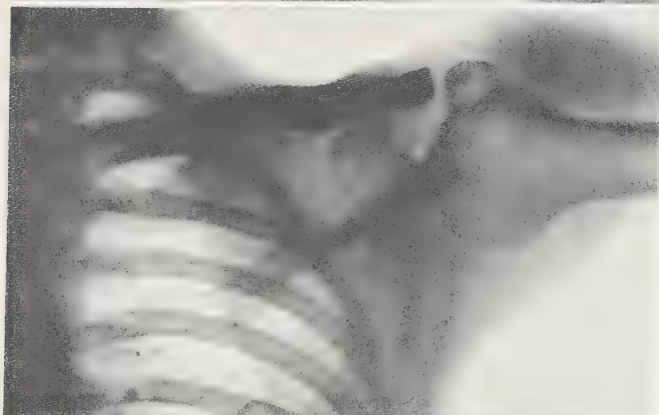


FIG. 35.—Roentgenogram left shoulder, arm abducted 90°.

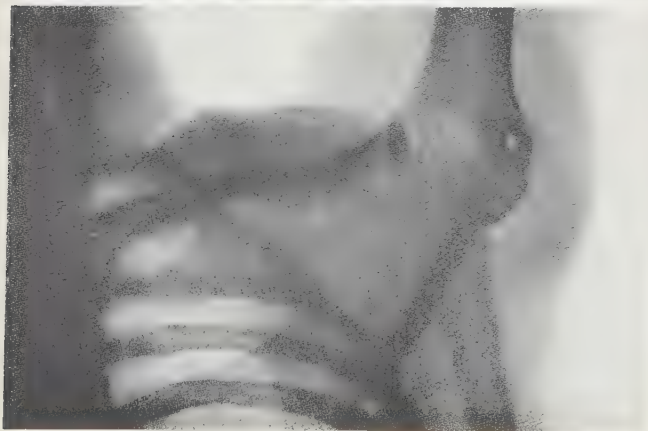


FIG. 36.—Roentgenogram left shoulder, arm extended overhead.

FIG. 37.—Labeled tracing of right elbow, extended, from front.

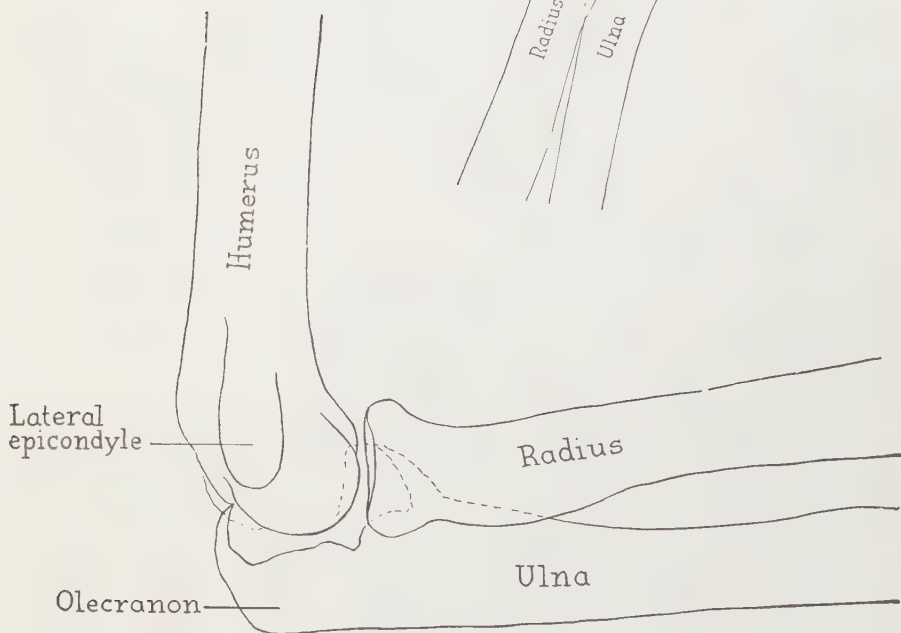
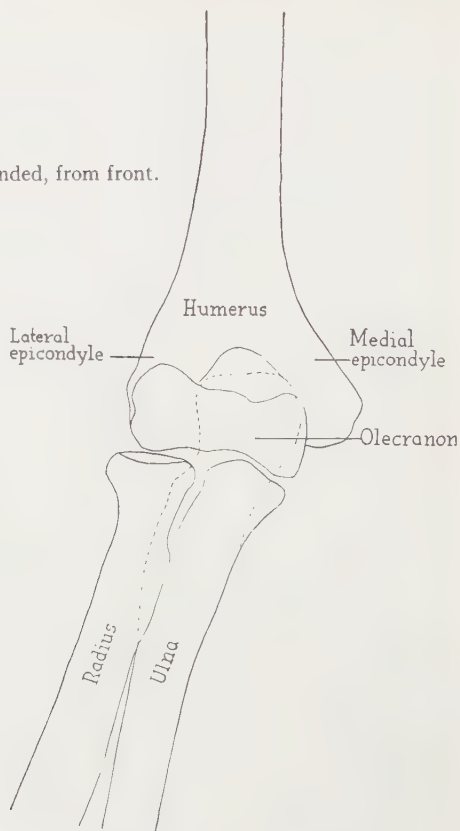


FIG. 38.—Labeled tracing of right elbow, bent 90°, from external side.

ARTICULATIONS AND MOVEMENTS

FIG. 39.—Roentgenogram right elbow, extended, from front.



FIG. 40.—Roentgenogram right elbow, bent 90°, from external side.



FIG. 41.—Labeled tracing right knee, extended, from inside.

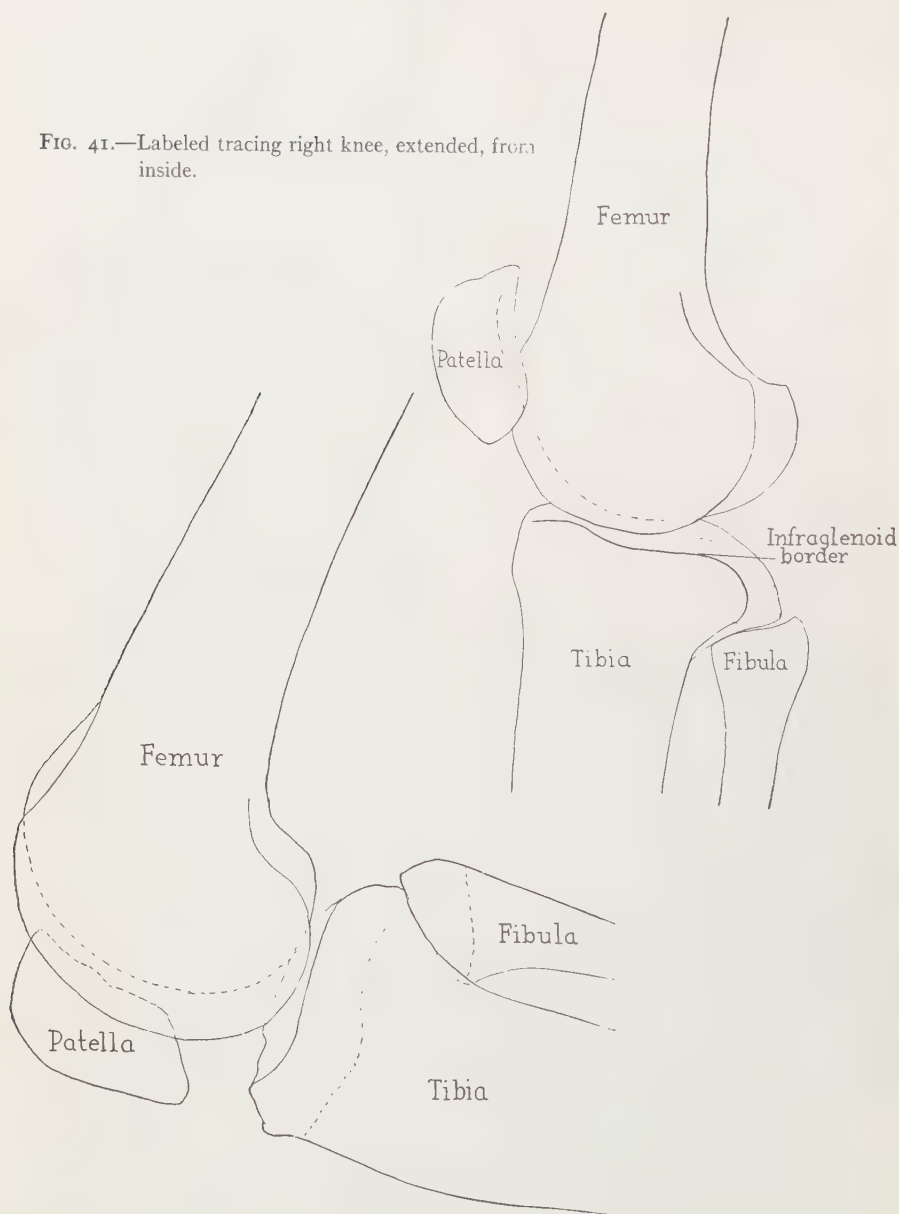


FIG. 42.—Labeled tracing right knee, bent 90°, from inside.

FIG. 43.—Roentgenogram right knee, extended, from inside.

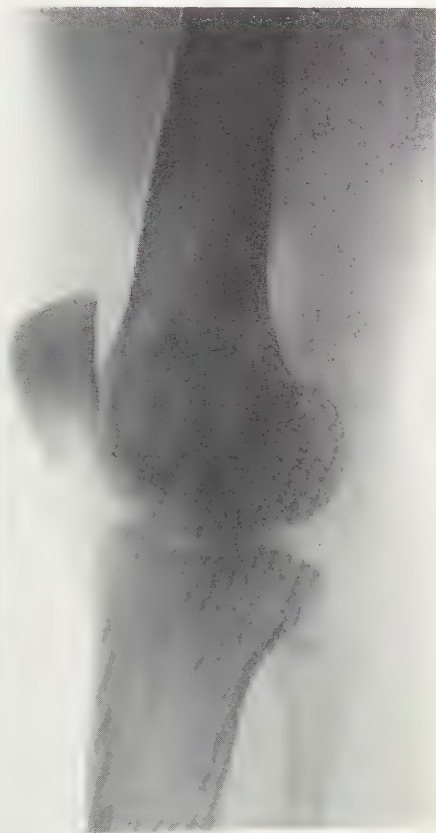


FIG. 44.—Roentgenogram right knee, bent 90° , from inside.

CHAPTER V

BONY LANDMARKS ON THE HUMAN FIGURE

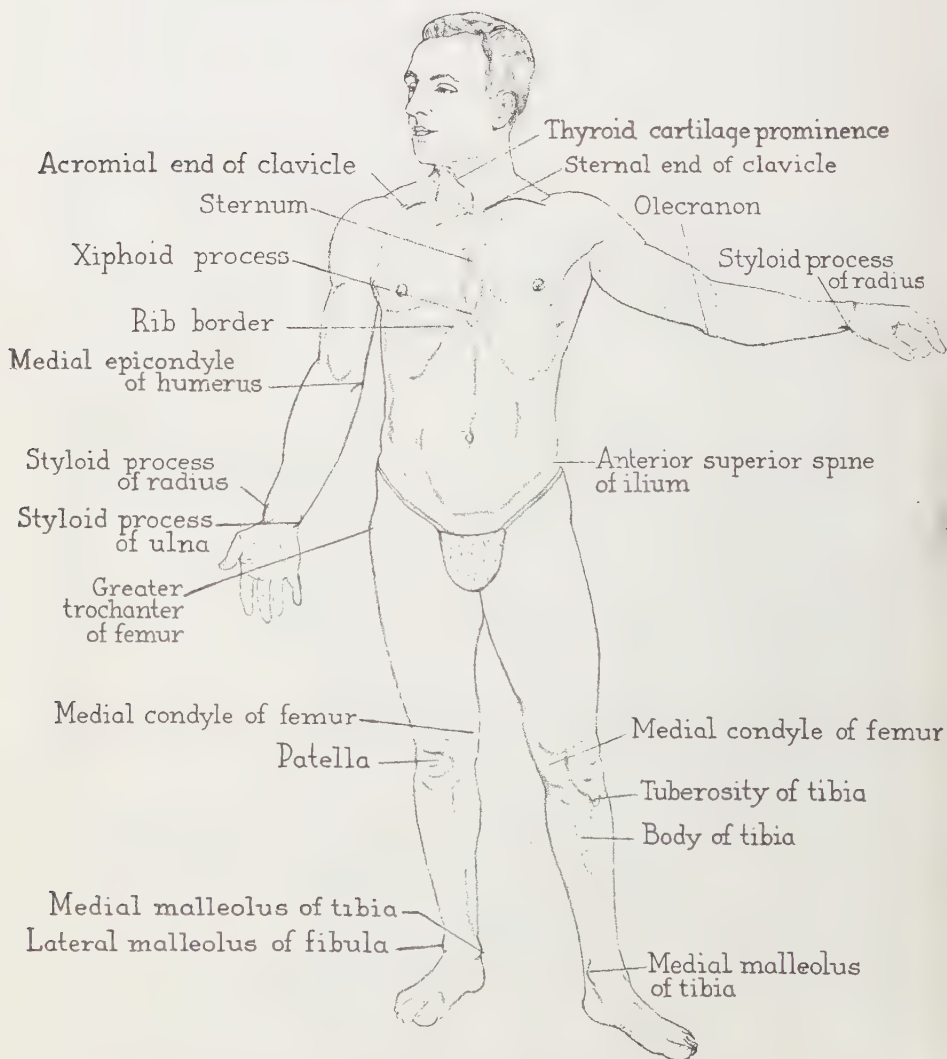


FIG 45.—Labeled sketch of male figure showing bony landmarks, anterior view.



FIG. 46.—Male figure, anterior view.

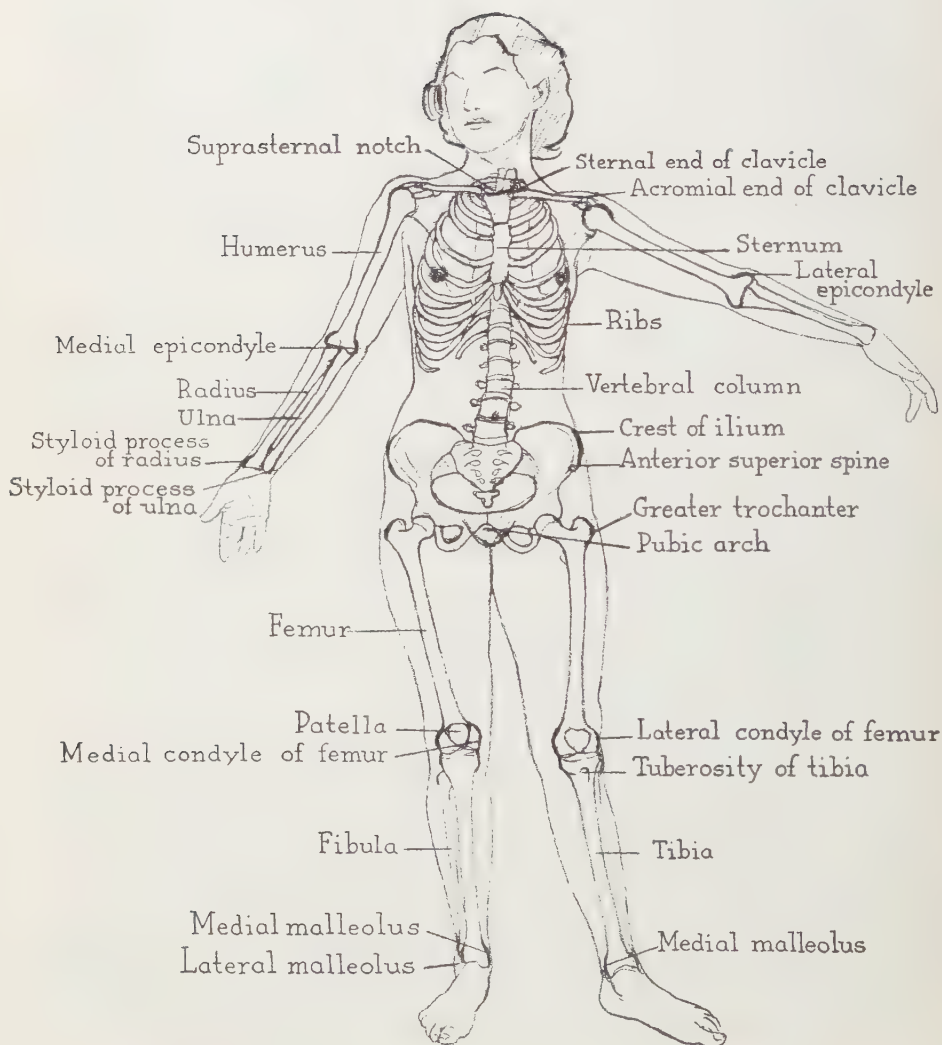


FIG. 47.—Labeled sketch of female figure, showing relationships of the skeleton to surface form.



FIG. 48.—Female figure, anterior view.

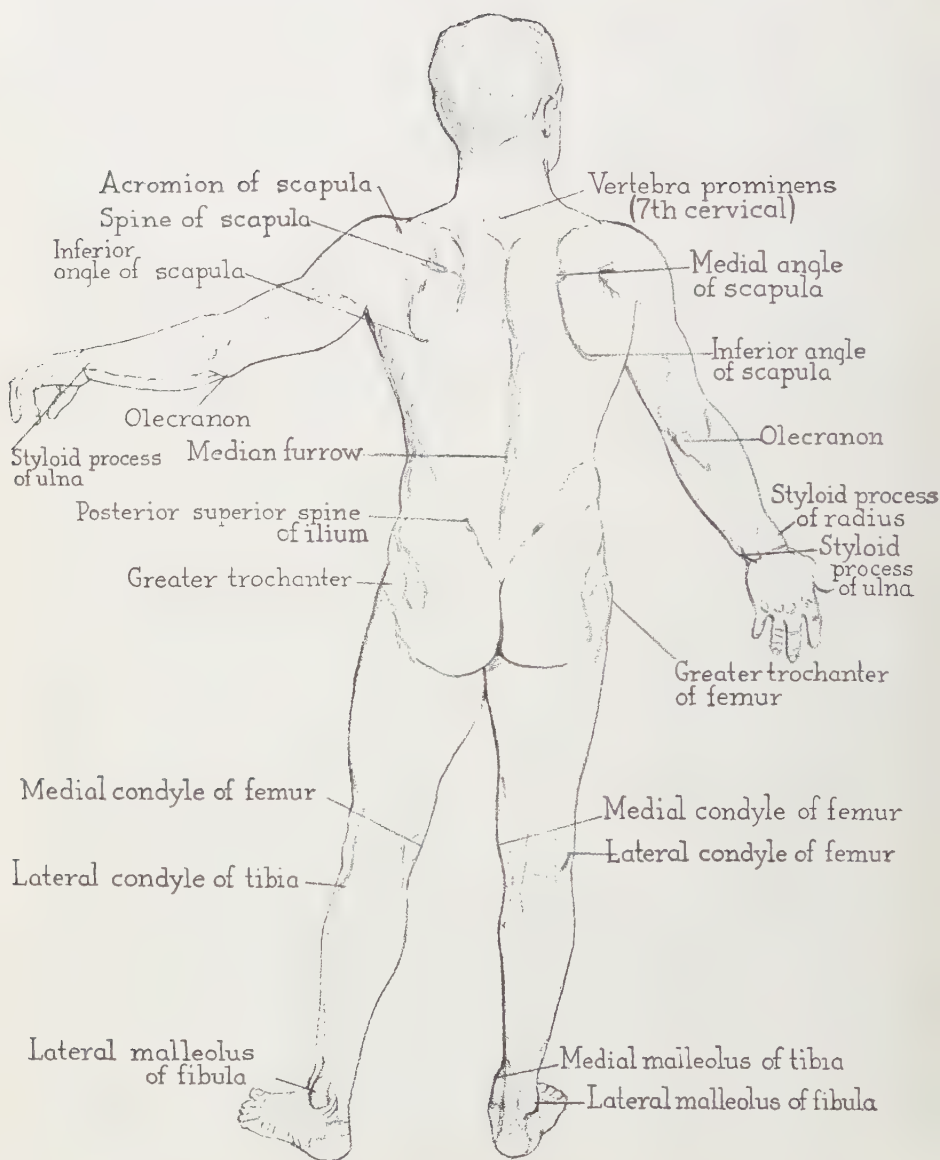


FIG. 49.—Labeled sketch of male figure showing bony landmarks, posterior view.



FIG. 50.—Male figure, posterior view.

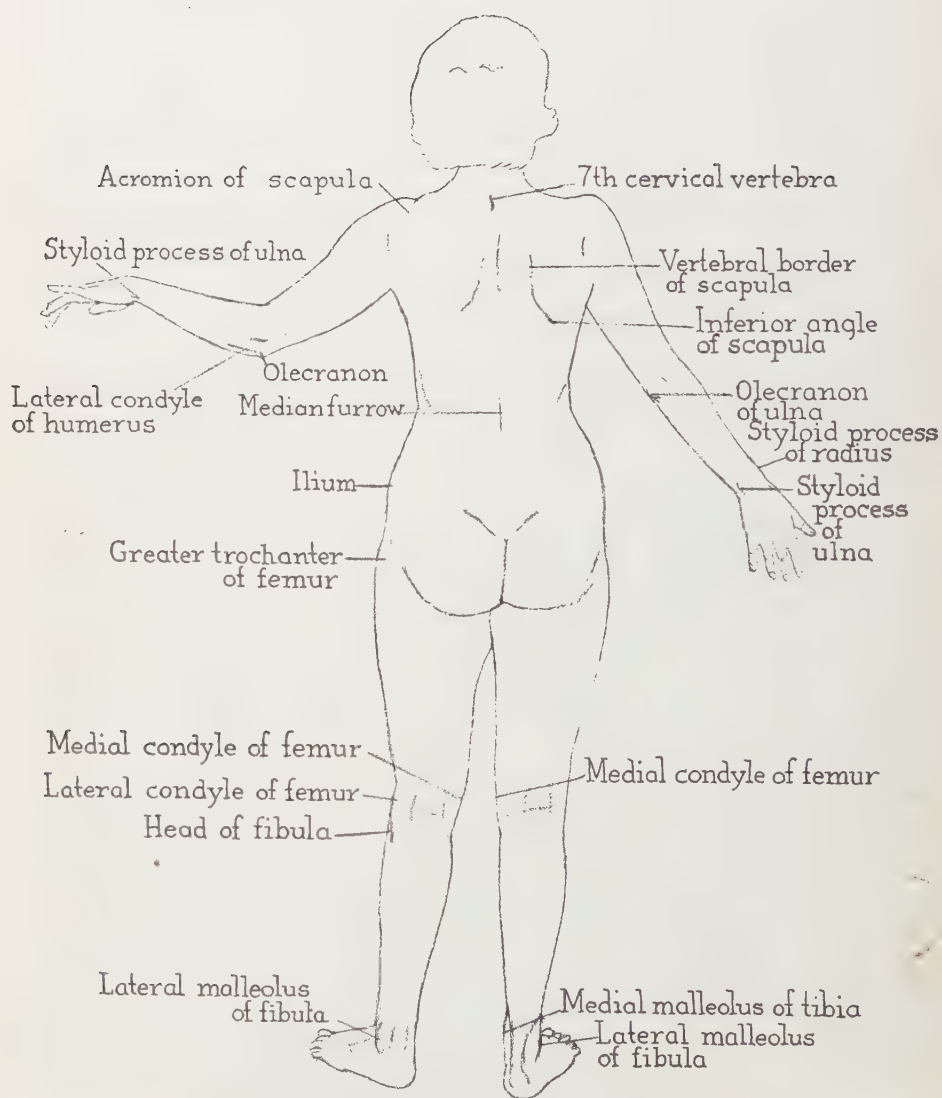


FIG. 51.—Labeled sketch of female figure showing bony landmarks, posterior view.



FIG. 52.—Female figure, posterior view.

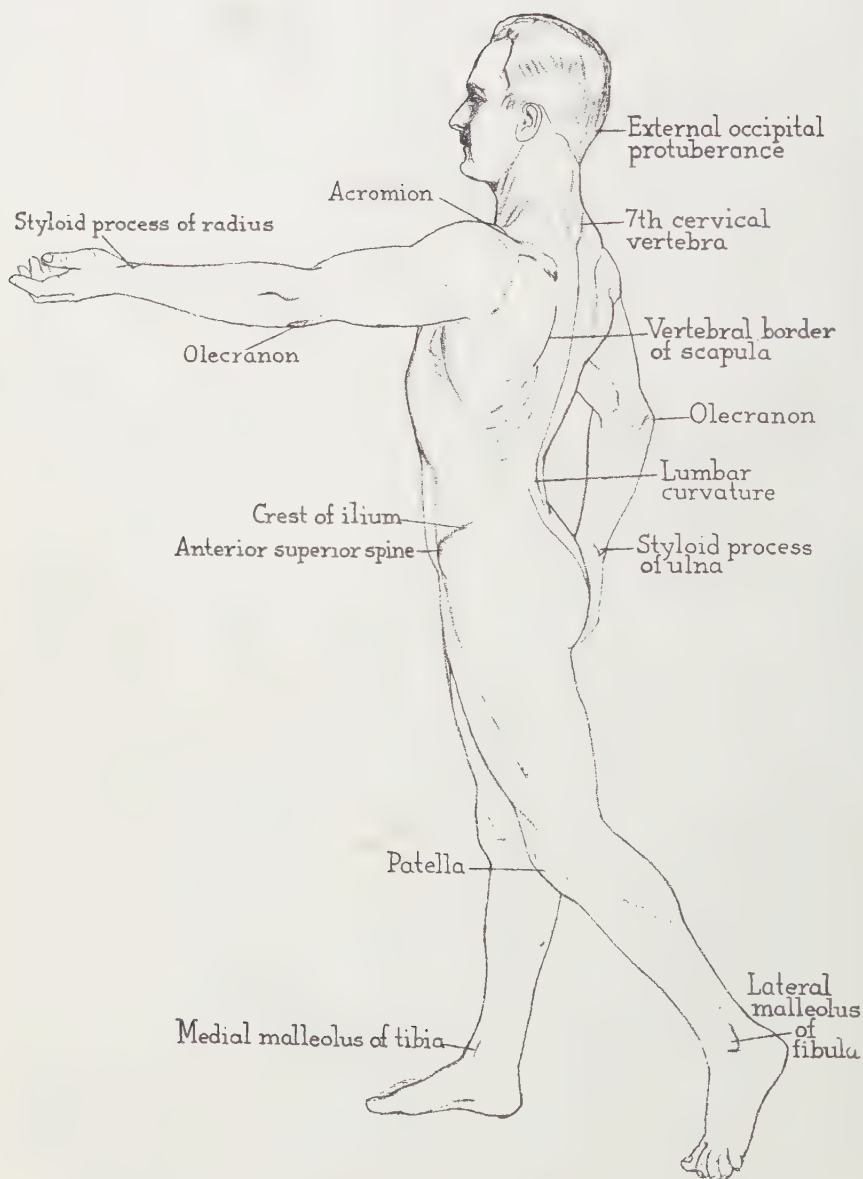


FIG. 53.—Labeled sketch of male figure from left side, showing bony landmarks.



FIG. 54.—Male figure, left side view.

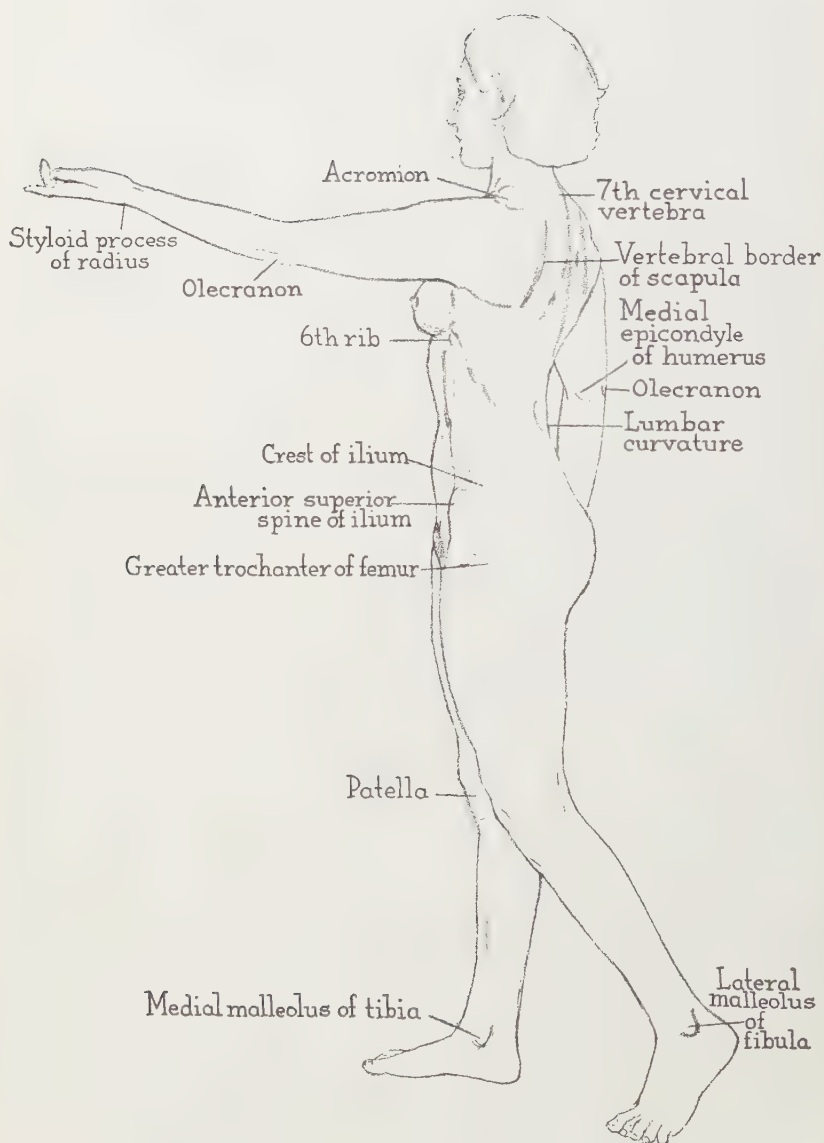


FIG. 55.—Labeled sketch of female figure from left side, showing bony landmarks.



FIG. 56.—Female figure, left side view.

CHAPTER VI

THE MUSCULAR SYSTEM

The voluntary (skeletal) muscles constitute about forty-five per cent of the total body weight. The muscles act on the bones as levers, and move the different parts of the body. (Fig. 57.) In order for a muscle to contract, it must possess:

Origin—a relatively fixed point of attachment, and toward which the contraction is made.

Belly—which swells when a muscle is in action.

Insertion—a movable point of attachment.

Muscles possess also **three types of attachments**:

Direct to bone (usually the origin).

By tendon—which is a white, glistening, non-elastic, strong cord.

By aponeurosis—which is a sheet of white, flat connective tissue.

Name of Muscles. Muscles have received their names because of:

FORM—example, gracilis (slender).

ACTION—example, levator scapulae (raise the scapula).

SITUATION—example, frontalis (front of forehead).

ATTACHMENTS—example, coracobrachialis (coracoid process to arm).

STRUCTURE—example, triceps (three heads).

FUNCTION—example, flexor (to bend).

DIRECTION—example, obliquus.

OCCUPATION—example, buccinator (trumpeter's muscle).

ACTIONS OF MUSCLES

Muscles act across joints (Fig. 57), usually in combination with others for most movements. When one muscle or group of muscles contract, others must relax to allow the movement to be carried through. Therefore, no muscle acts purely by itself; the more complicated muscular actions are always in perfect harmony.

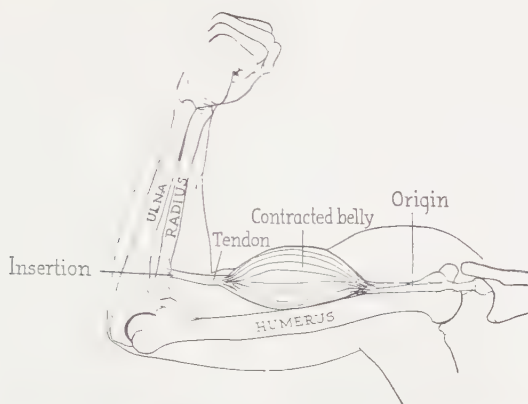


FIG. 57.—Diagram showing contraction of biceps brachii muscle.



FIG. 58.—Flexed right arm, showing contraction of the biceps brachii muscle.

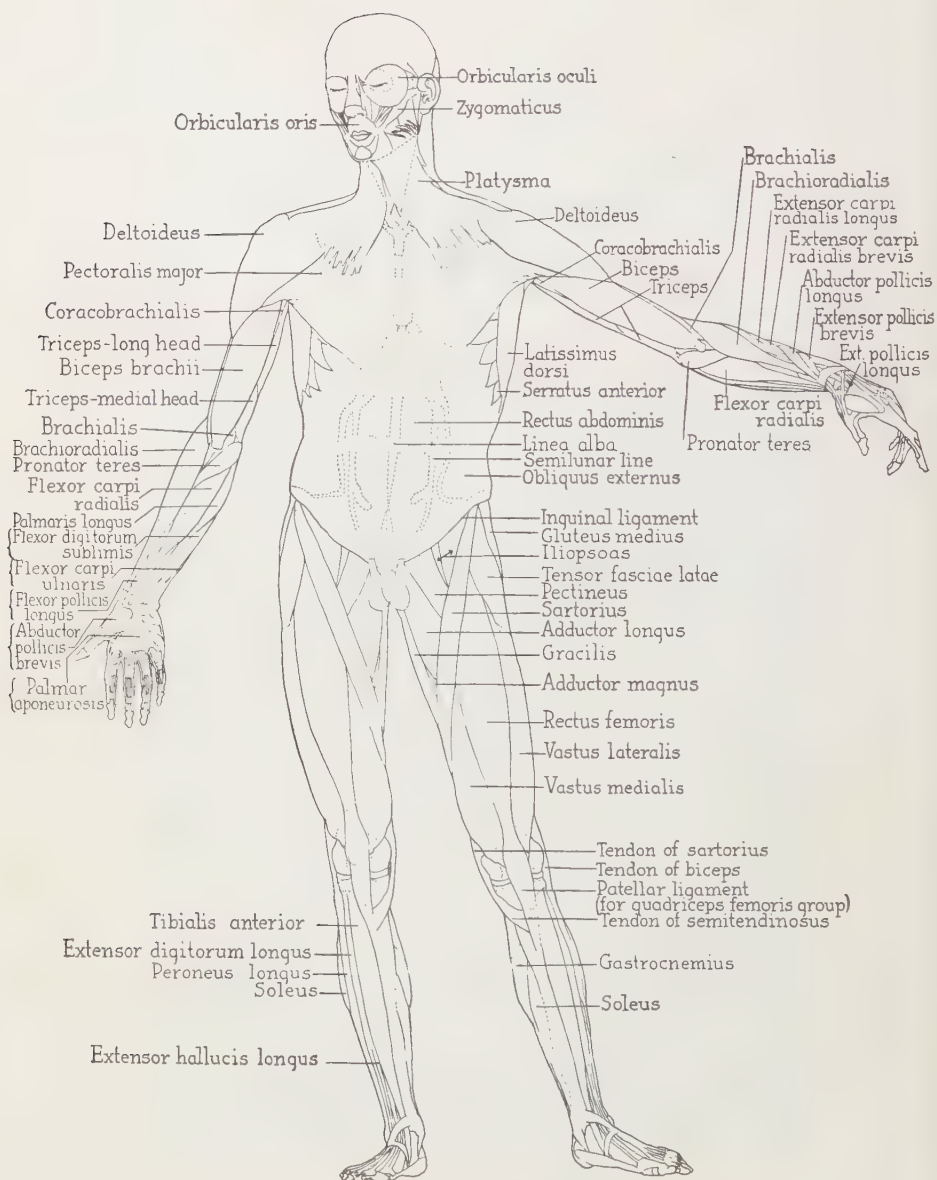


FIG. 59.—Labeled sketch of muscles, superficial layer, anterior view.



FIG. 60.—Muscles, superficial layer, anterior view. (Albinus.)

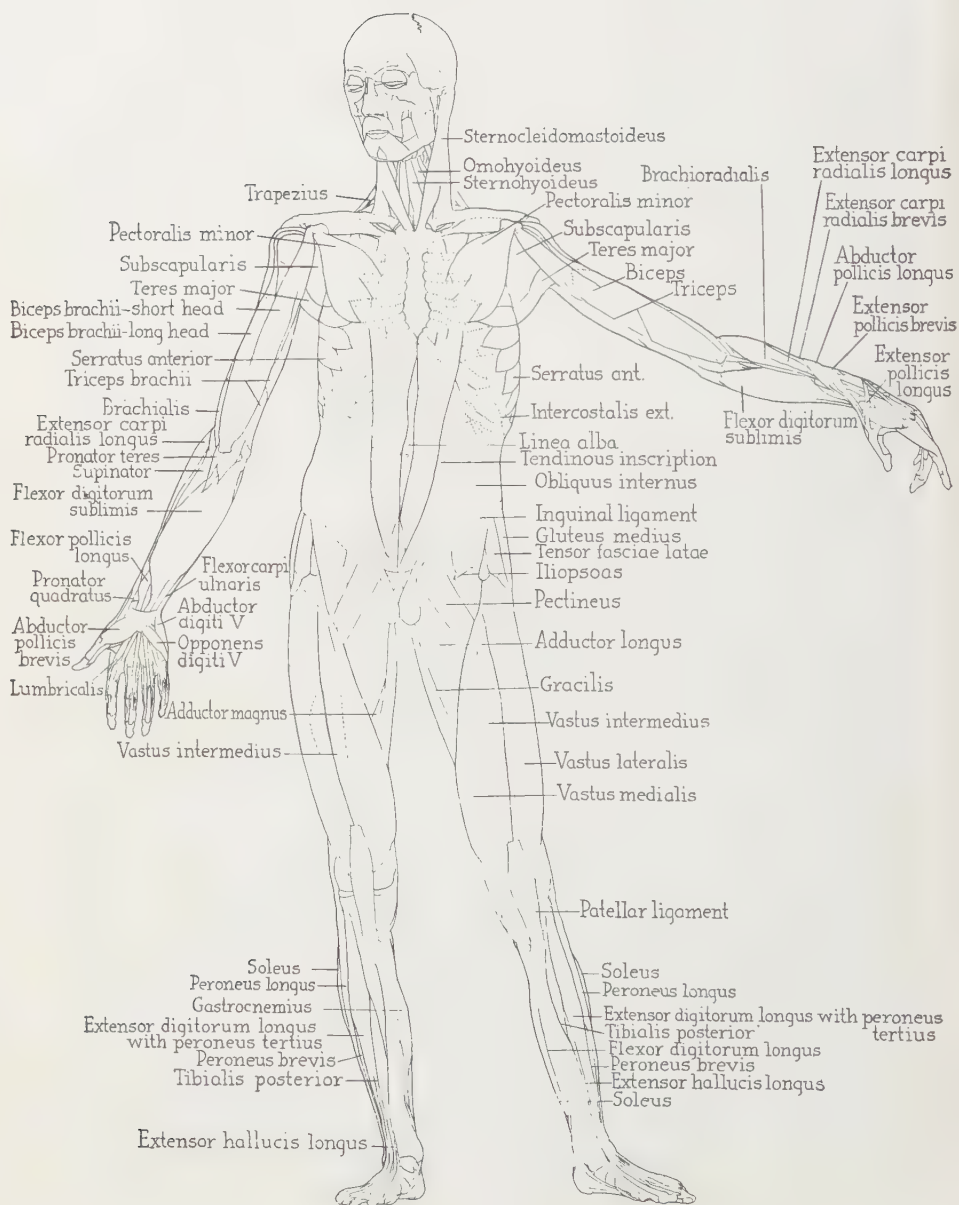


FIG. 61.—Labeled sketch of muscles, deep layer, anterior view.

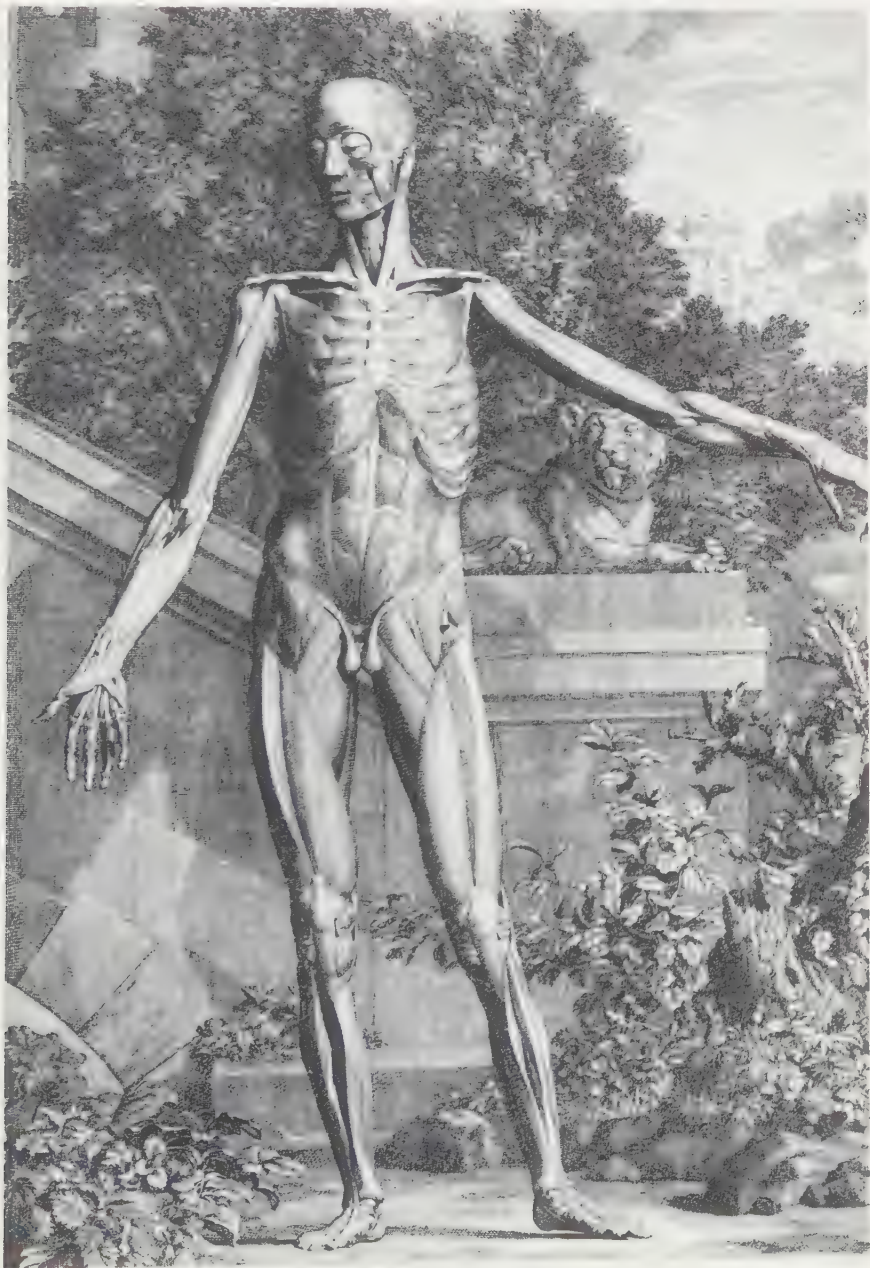


FIG. 62.—Muscles, deep layer, anterior view. (Albinus.)

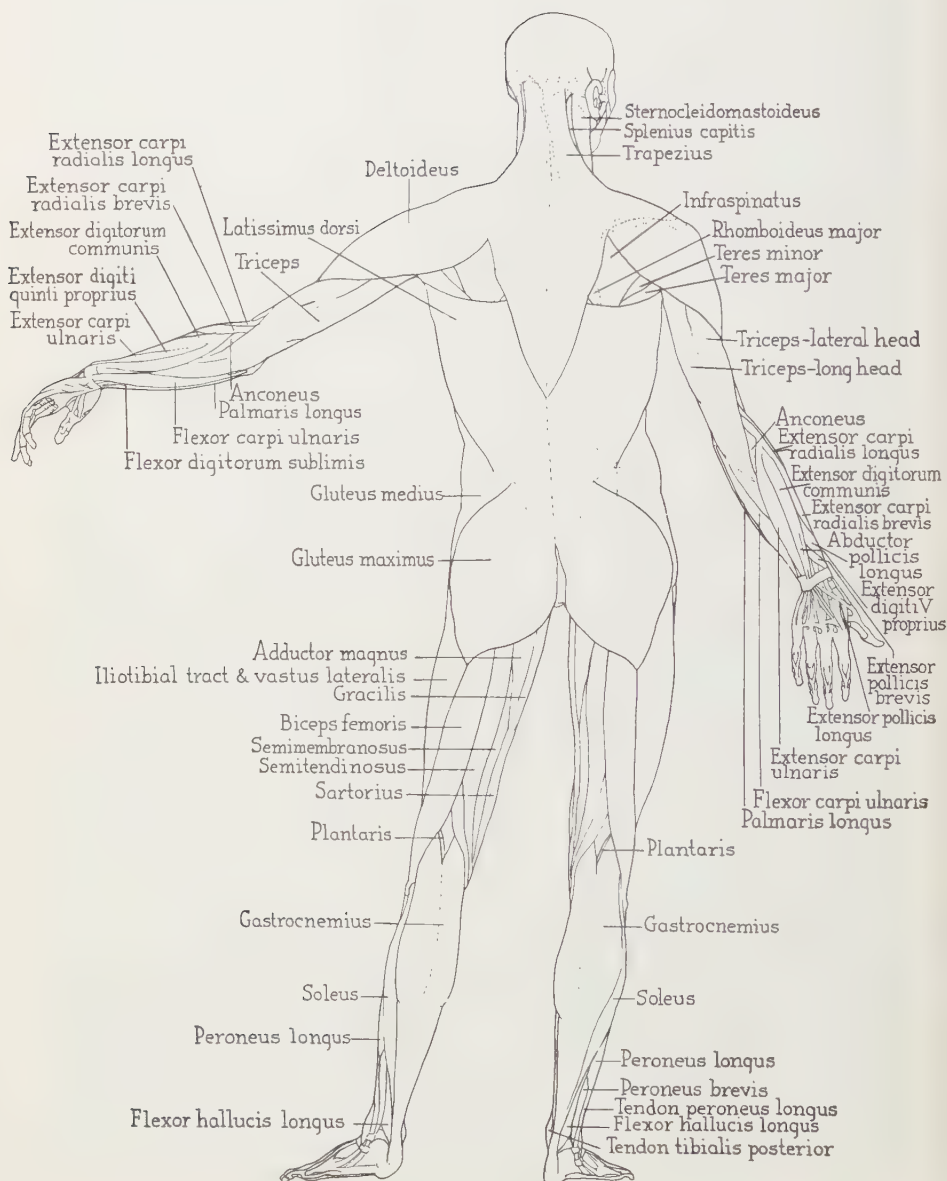


FIG. 63.—Labeled sketch of muscles, superficial layer, posterior view.

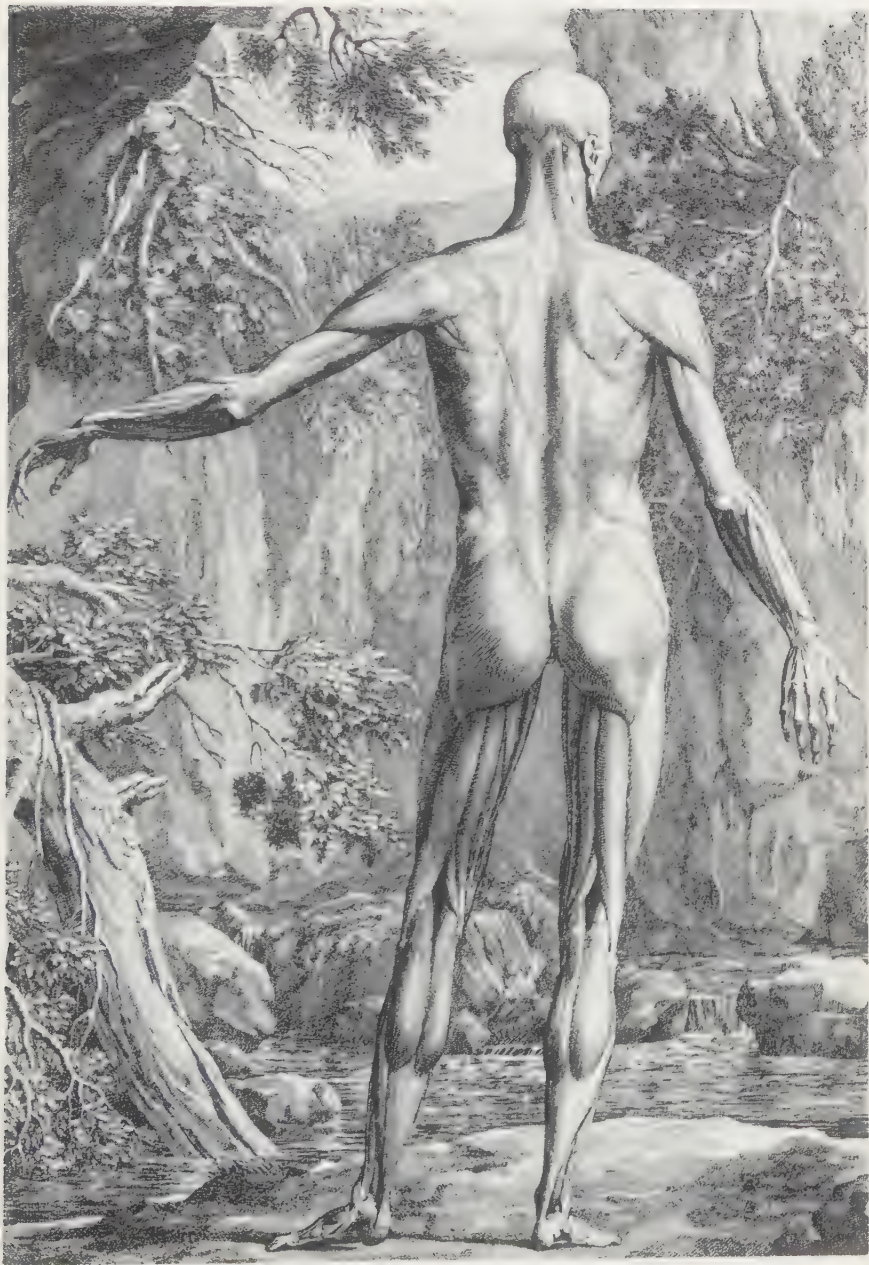


FIG. 64.—Muscles, superficial layer, posterior view. (Albinus.)

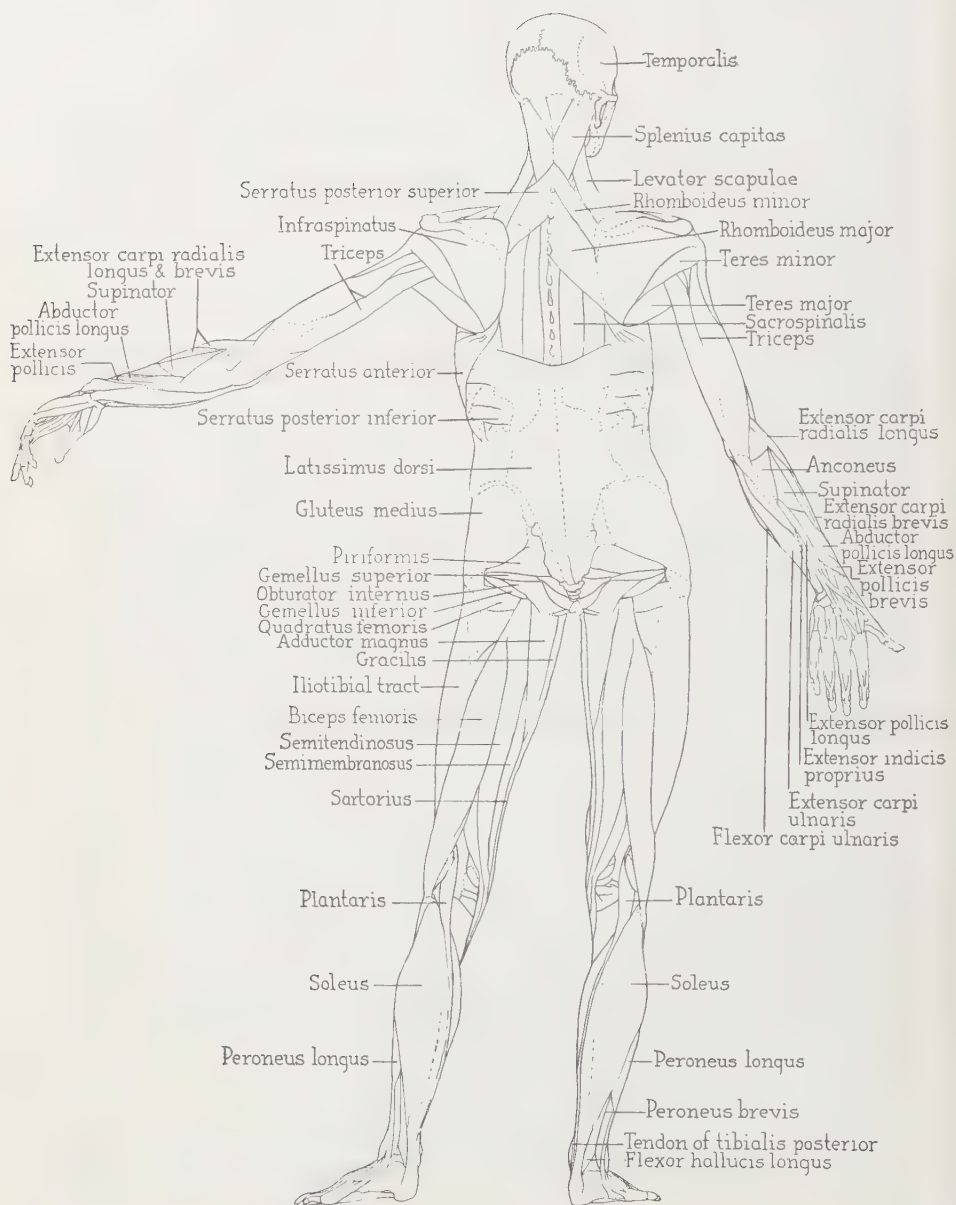


FIG. 65.—Labeled sketch of muscles, deep layer, posterior view.

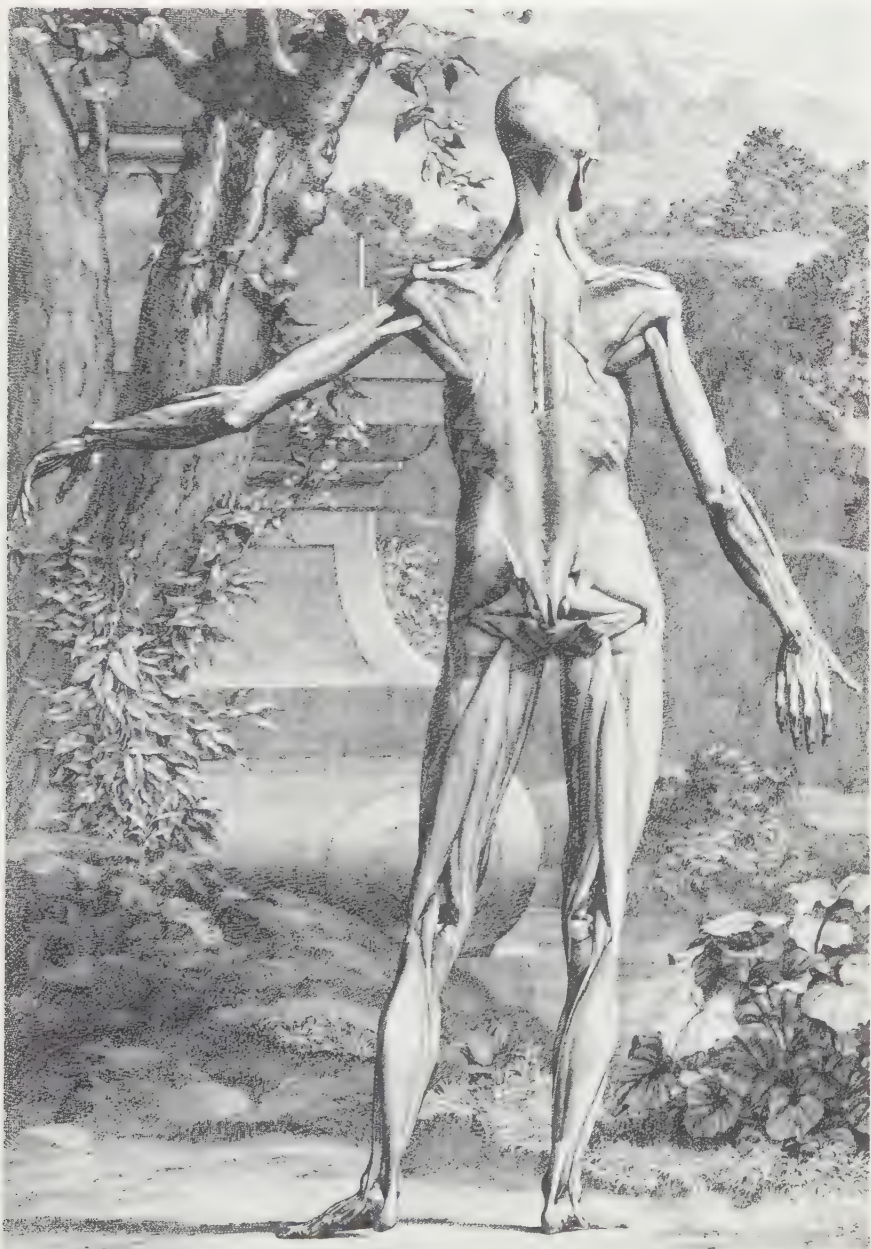


FIG. 66.—Muscles, deep layer, posterior view. (Albinus.)

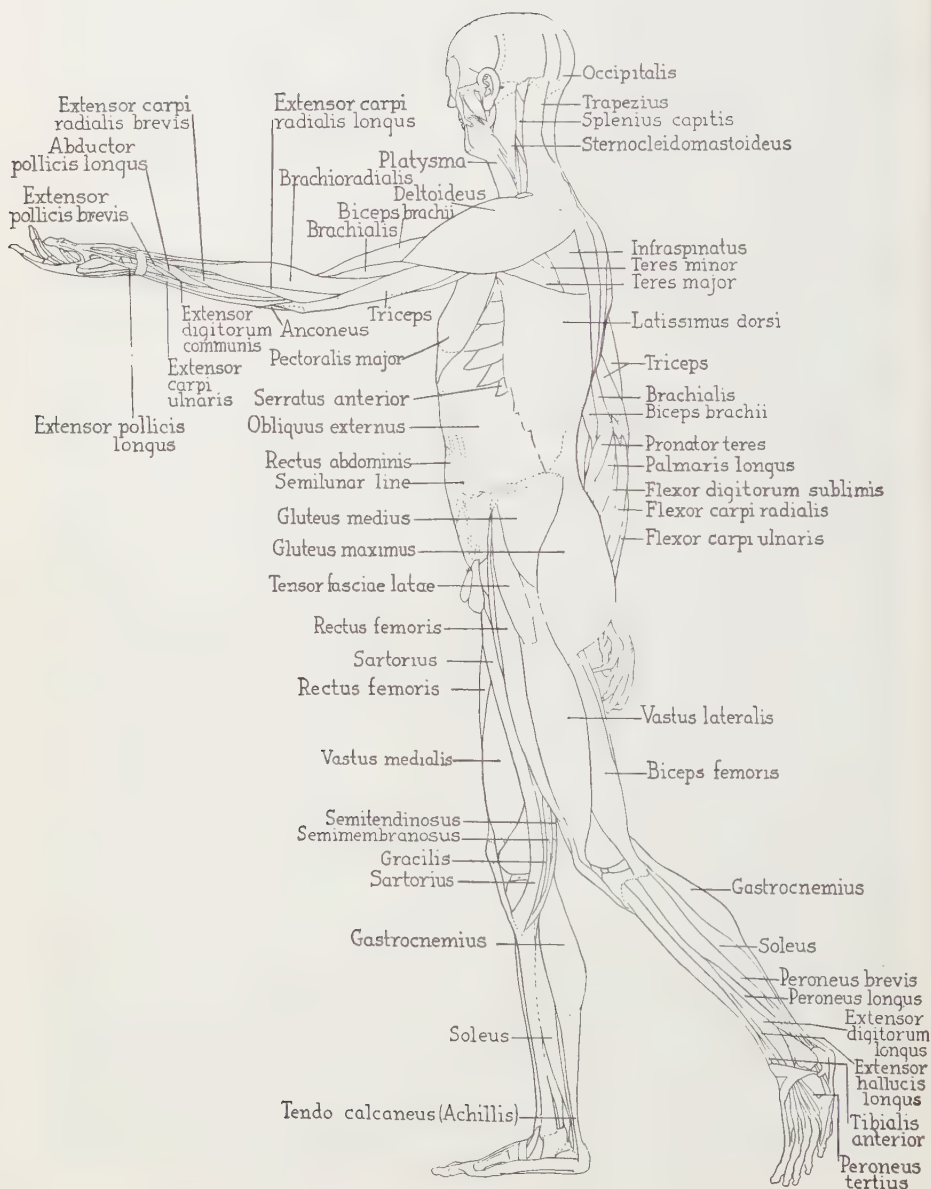


FIG. 67.—Labeled sketch of muscles, viewed from the left side.

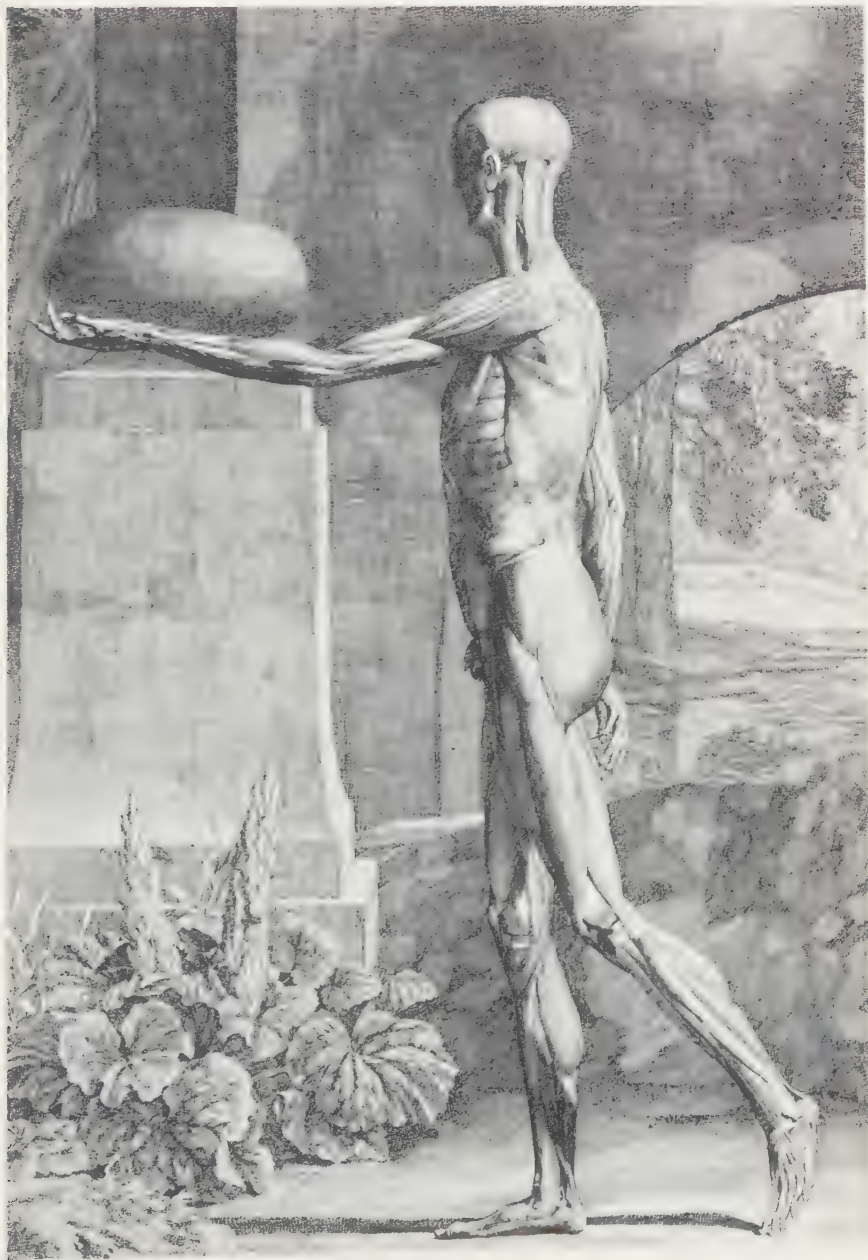


FIG. 68.—Muscles, viewed from the left side. (Albinus.)

MUSCLES SHOWN IN FIG. 69

MUSCLE	ORIGIN	INSERTION	ACTION
Auricularis anterior	Temporal fascia	Cartilage of ear	Draws ear forward
Auricularis superior	Epicranial aponeurosis	Cartilage of ear	Draws ear upward
Brachialis	Lower two-thirds of anterior surface of humerus	Coronoid process of ulna	Flexes forearm
Brachioradialis	External epicondylar ridge of humerus	In front of base of styloid process of radius	Flexes forearm and assists slightly in supination
Coracobrachialis	Coracoid process of scapula	Middle one-third of humerus	Adducts and flexes arm Assists in medial rotation
Extensor digitorum longus	Body and lateral condyle of tibia, upper anterior two-thirds of fibula by interosseous membrane	The four lateral toes	Dorsi-flexor of ankle; extensor of the four lateral toes
Flexor carpi ulnaris	Medial epicondyle of humerus, and ulnar head of olecranon process of ulna	Pisiform bone chiefly	Flexes and adducts the wrist; steadies pisiform bone; helps flex elbow joint
Flexor digiti quinti brevis	Hamate bone of wrist	First phalanx of little finger	Flexes first phalanx of little finger
Flexor pollicis brevis	Ulnar side of first metacarpal bone	Inner side base of first phalanx of thumb	Flexor of thumb; assists in opposing thumb to the fingers
Gracilis	Rami of pubis near symphysis	Shaft of tibia below medial condyle	Flexes knee; adducts thigh, rotates leg medially
Orbicularis oculi	Maxilla, frontal bone, and medial palpebral ligament	There is no bony insertion. The muscle fibres form a complete ellipse and terminate at the origin	Closes eye; draws eyelid towards median line; stretches skin of forehead
Orbicularis oris	Various muscles converging into the mouth	No bony insertion. Skin of lips	Draws lips together; helps in infinite variety of facial expressions as joy, grief, despair, etc.
Pectoralis major	Anterior medial half clavicle; sternum; cartilages of first six ribs; external oblique aponeurosis	Intertubercular sulcus of crest of humerus	Adducts, flexes, and rotates arm medially
Pectoralis minor	3rd to 5th ribs near anterior ends	Tip of coracoid process of scapula	Pulls scapula forward or ribs up
Platysma	Fascia covering pectoralis major and deltoid muscles	Inferior border of mandible; risorius muscle in corner of mouth	Depresses angle of mouth; wrinkles skin of neck in oblique direction; depresses lower jaw
Rectus abdominis	Symphysis and crest of pubis	Xiphoid process and 5-7 ribs	Draws thorax downward; flexes vertebral column and pelvis, supports abdominal viscera
Rectus femoris	Anterior inferior spine of ilium	Common tendon of quadriceps femoris or patella	Extensor of leg at knee; flexor of hip-joint; flexes body on hips
Sartorius	Anterior superior spine of ilium	Medial aspect of tuberosity of tibia	Flexes thigh and leg; rotates thigh laterally
Tibialis anterior	Upper outer two-thirds of tibia	First cuneiform and base of first metatarsal	Dorsi-flexion of ankle; helps invert foot
Zygomaticus	Zygomatic bone	Partly in skin about angle of mouth; partly into the orbicularis oris	Draws upper lip upward as in laughing; aids in other facial expressions

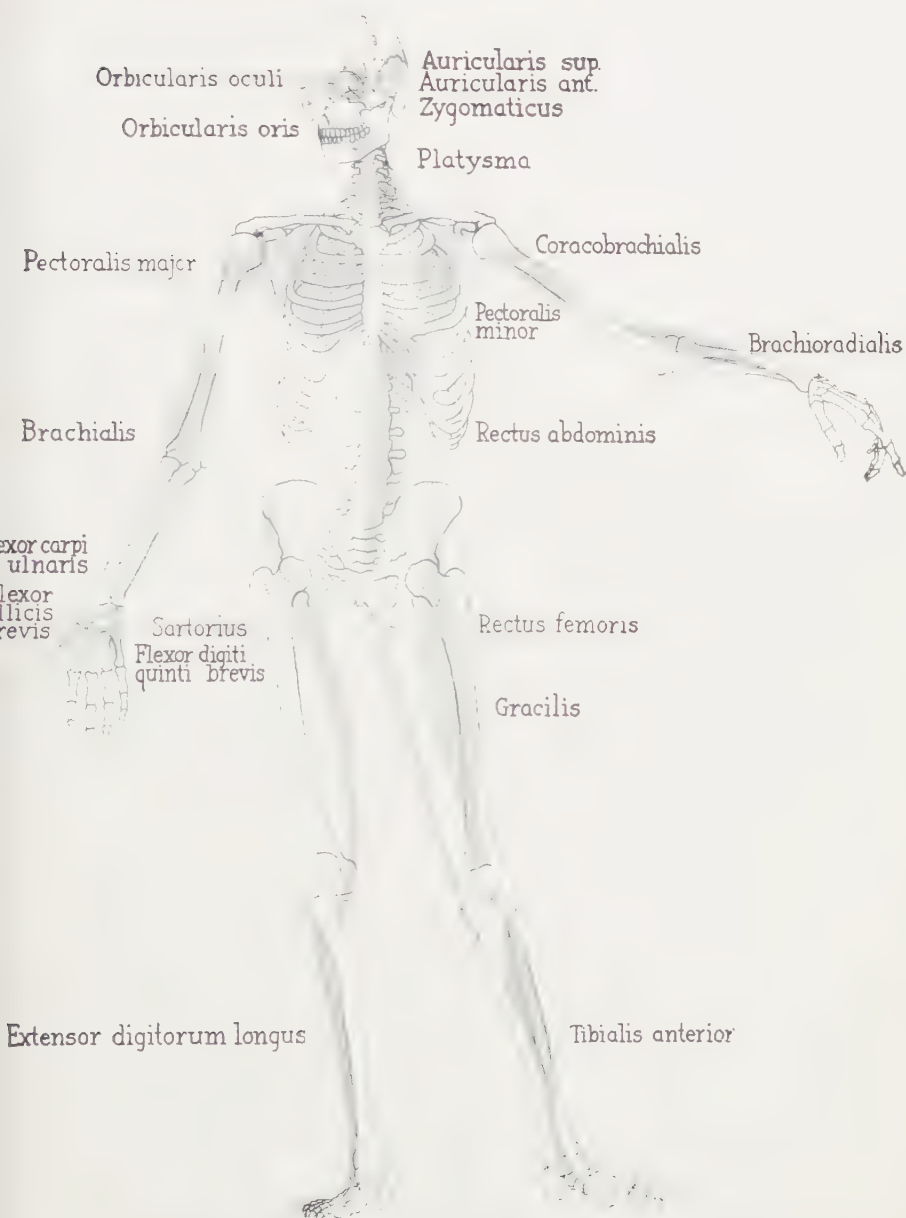


FIG. 69.—Projection of muscles on anterior view of skeleton showing attachments.

MUSCLES SHOWN IN FIG. 70

MUSCLE	ORIGIN	INSERTION	ACTION
Abductor digiti quinti	Pisiform bone	First phalanx of little finger	Separates the little finger from the ring finger; flexes the first phalanx of little finger
Abductor pollicis brevis	Ridge on multangulum majus (trapezium); and navicular bone	Outer side base first phalanx of thumb	Abducts thumb; flexes the first and extends the second phalanx
Adductor pollicis	Shaft of third metacarpal bone, multangulum majus and minus, and capitate bone	Inner side base of first phalanx	Adduction and opposition of thumb
Adductor longus	Symphysis and crest of pubic bone	Middle third of inner lip of linea aspera	Adducts, flexes, and assists in lateral rotation of thigh
Biceps brachii	Short head from coracoid process; long head from supraglenoid tuberosity of scapula	Tubercle of radius	Short head adducts arm; long head abducts; flexes and supinates forearm; flexes and rotates arm medially
Deltoides	Lateral third clavicle; acromion, and inferior edge of spine of scapula	Deltoid tubercle of humerus	Abducts arm; anterior part flexes and rotates arm medially; posterior part extends and rotates arm laterally
Extensor hallucis longus	Middle half of fibula	Terminal phalanx of great toe	Extends great toe; flexes foot
Flexor carpi radialis	Medial epicondyle of humerus	Bases of 2 and usually 3 metacarpal bones	Flexes wrist primarily; assists in abduction of hand
Obliquus externus abdominus	5th to 12th ribs	Anterior two-thirds outer lip of iliac crest. Linea alba, inguinal ligament	Compresses abdomen; draws thorax downward
Obliquus internus abdominus	Outer half of inguinal ligament, anterior half of crest of ilium, lumbar fascia	10th to 12th ribs, 7th to 9th costal cartilages, linea alba of rectus	Compresses abdomen; draws thorax forward; flexes and rotates vertebral column
Pectineus	Crest of pubis	Pectineal line of femur	Flexes and adducts thigh
Peroneus tertius	Distal third of fibula	Base of 5th metatarsal	Assists in dorsal flexion of foot and everts it
Pronator teres	Medial epicondyle of humerus and coronoid process of ulna	Middle third of lateral surface of radius	Pronates forearm; assists in flexion of elbow-joint
Quadratus labii superioris	<i>Angular head:</i> frontal process of maxilla (root of nose) <i>Infraorbital head:</i> maxilla <i>Zygomatic head:</i> zygomatic bone near orbicularis oculi	<i>Angular head:</i> alar cartilage of nose and orbicularis oris <i>Infraorbital head:</i> orbicularis oris and skin of upper lip <i>Zygomatic head:</i> skin of upper lip	Helps in variety of facial expressions
Serratus anterior	Lateral surfaces of upper 8 ribs	Vertebral border of scapula	Draws scapula forward; rotates inferior angle of scapula laterally and forward
Sternocleidomastoideus	Medial third of clavicle and manubrium of sternum	Mastoid process and occipital bone	Rotates head to opposite side; bends head and neck toward shoulder; both sides acting together flex head on chest and extend the head
Vastus lateralis	Lateral lip of linea aspera of femur	Common tendon of quadriceps femoris to tibia	Extends leg at knee; flexes hip-joint; flexes body on hips
Vastus medialis	Medial lip of linea aspera of femur	Common tendon of quadriceps femoris to tibia	Extends leg at knee; flexes hip-joint; flexes body on hips

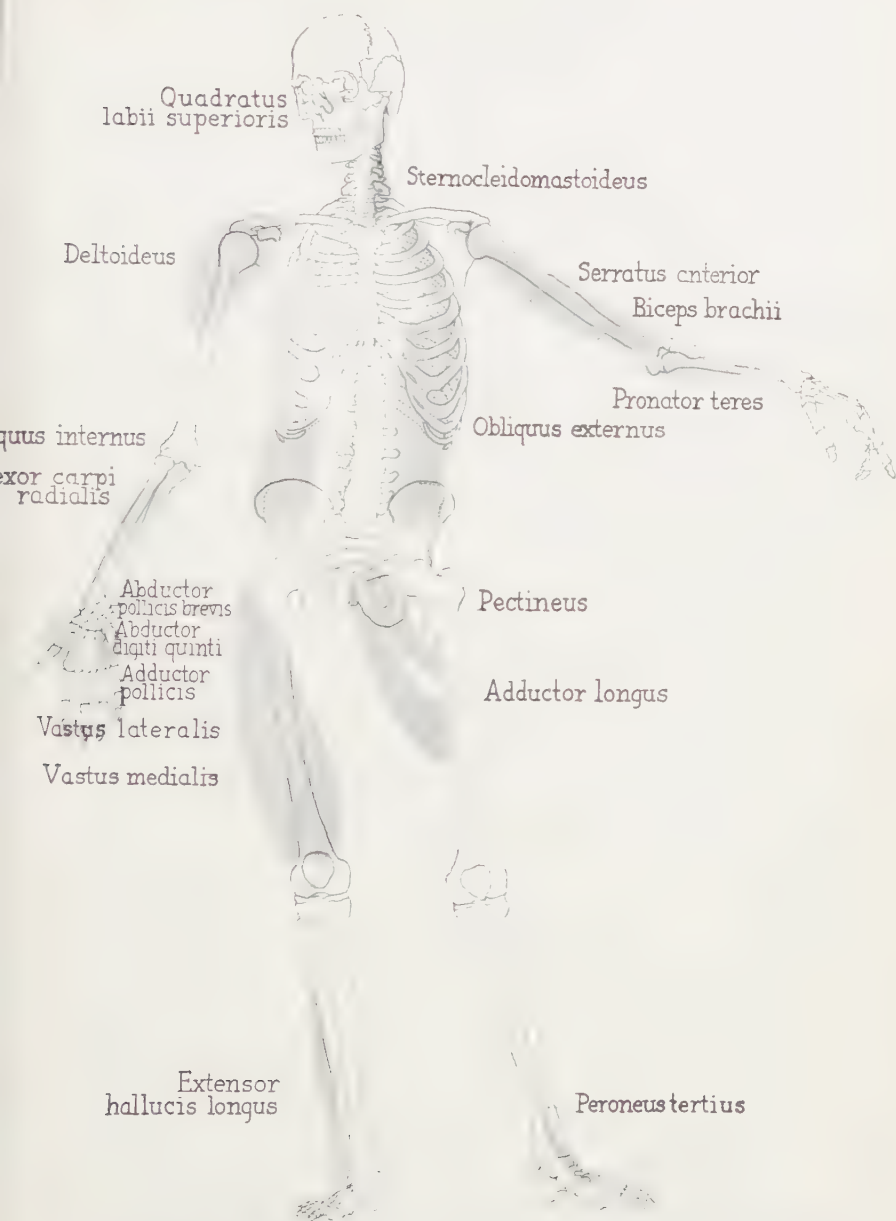


FIG. 70.—Projection of muscles on anterior view of skeleton showing attachments.

MUSCLES SHOWN IN FIG. 71

MUSCLE	ORIGIN	INSERTION	ACTION
Adductor brevis	Inferior ramus of pubis	Upper third of linea aspera of femur	Assists in adduction, flexion, and lateral rotation of thigh
Adductor magnus	Ischial tuberosity	Linea aspera of femur, tubercle above medial condyle	Adducts thigh; assists in flexion, extension, and lateral rotation
Flexor digitorum sublimis	Medial epicondyle of humerus, coronoid process of ulna, and proximal part of radius	Second phalanges of fingers	Flexes middle phalanges of the fingers, and hand
Iliopsoas	Iliac fossa of ilium, 12th thoracic to 5th lumbar vertebrae	Small trochanter of femur	Flexes thigh; adducts and rotates hip-joint medially
Intercostalis externus	Lower border of each rib	Upper border of next rib	Elevate ribs and aid in respiration
Masseter	Zygomatic arch	Lateral surface of ramus of mandible and coronoid process	Raises mandible and draws it forward
Opponens pollicis	Great multangular bone and transverse carpal ligament	Metacarpal of thumb	Simultaneously draws first metacarpal bone medially and forwards
Palmaris longus	Medial epicondyle of humerus	Fascia of palm	Flexes the wrist; tenses the fascia of palm
Transversus abdominis	Lower six costal cartilages; lumbodorsal fascia; anterior two-thirds internal lip of iliac crest; lateral third of inguinal ligament	Xiphoid process; linea alba; pubic tubercle	Compresses abdomen

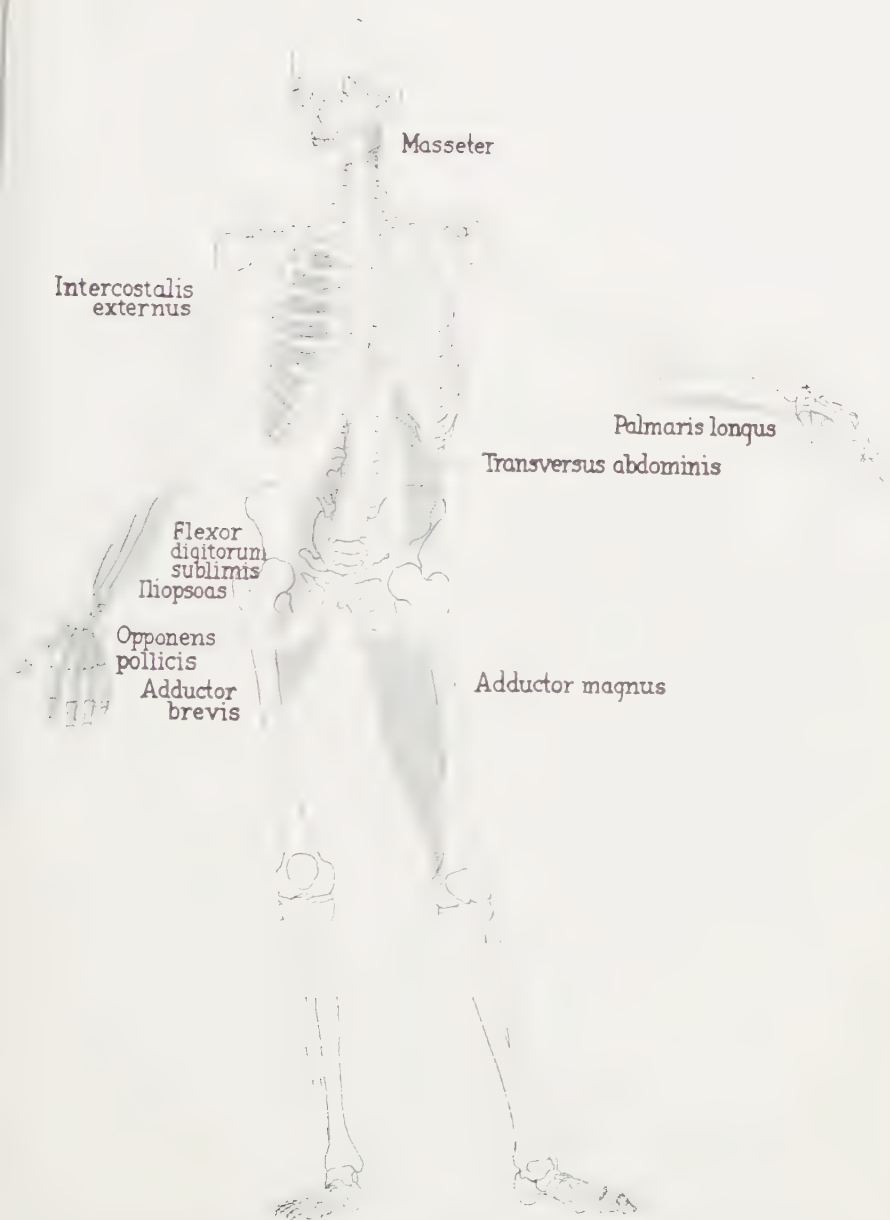


FIG. 71.—Projection of muscles on anterior view of skeleton showing attachments.

MUSCLES SHOWN IN FIG. 72

MUSCLE	ORIGIN	INSERTION	ACTION
Biceps femoris	Long head from ischial tuberosity; short head from middle third of linea aspera	Lateral condyle of tibia; head of fibula	Flexes knee-joint; extends thigh; rotates leg laterally when knee is flexed
Extensor carpi ulnaris	Lateral epicondyle of humerus; proximal part of ulna	Base of fifth metacarpal	Extensor and adductor of the wrist, and fifth finger
Extensor digitorum communis	Lateral epicondyle of humerus	By four tendons into phalanges of fingers	Extends fingers and wrist
Extensor digiti quinti proprius	Lateral epicondyle of humerus	First phalanx of little finger	Extends little finger (and wrist)
Gastrocnemius	Medial and lateral condyles of femur	Calcaneus, through tendon of Achilles	Flexes knee; extends adducts and inverts foot
Gluteus maximus	Ilium, sacrum, coccyx, sacrotuberous ligament	Iliotibial tract and gluteal tuberosity of femur	Extends thigh, adducts thigh and rotates it laterally
Latissimus dorsi	Spines of lower 6 thoracic vertebrae, lumbodorsal fascia, crest of ilium, upper lumbar vertebrae, lower 3 or 4 ribs, inferior angle of scapula	Intertubercular sulcus of humerus	Adducts, extends and rotates arm medially
Plantaris	Lateral epicondylar line of femur	Inner margin of tendon of Achilles (calcaneus tendon)	Flexes leg and extends foot
Soleus	Middle third of tibia, head and proximal third of fibula	Calcaneus, through tendon of Achilles	Extends, adducts and inverts foot
Splenius capitis	Nuchal ligament, upper three thoracic vertebrae	Mastoid process of temporal bone and occipital bone	Rotates head; together draw head backwards
Trapezius	Occipital bone, nuchal ligament, seventh cervical and all thoracic vertebrae	Lateral third of clavicle, acromion, and lateral part of spine of scapula	Rotates inferior angle of scapula laterally and forwards; elevates lateral end of clavicle, of scapula; approximates the scapulae; extends the head
Triceps brachii	Long head, from infraglenoid tuberosity. Medial and lateral head, from posterior surface of humerus	Olecranon of ulna	Extends forearm, long head adducts the arm at shoulder-joint

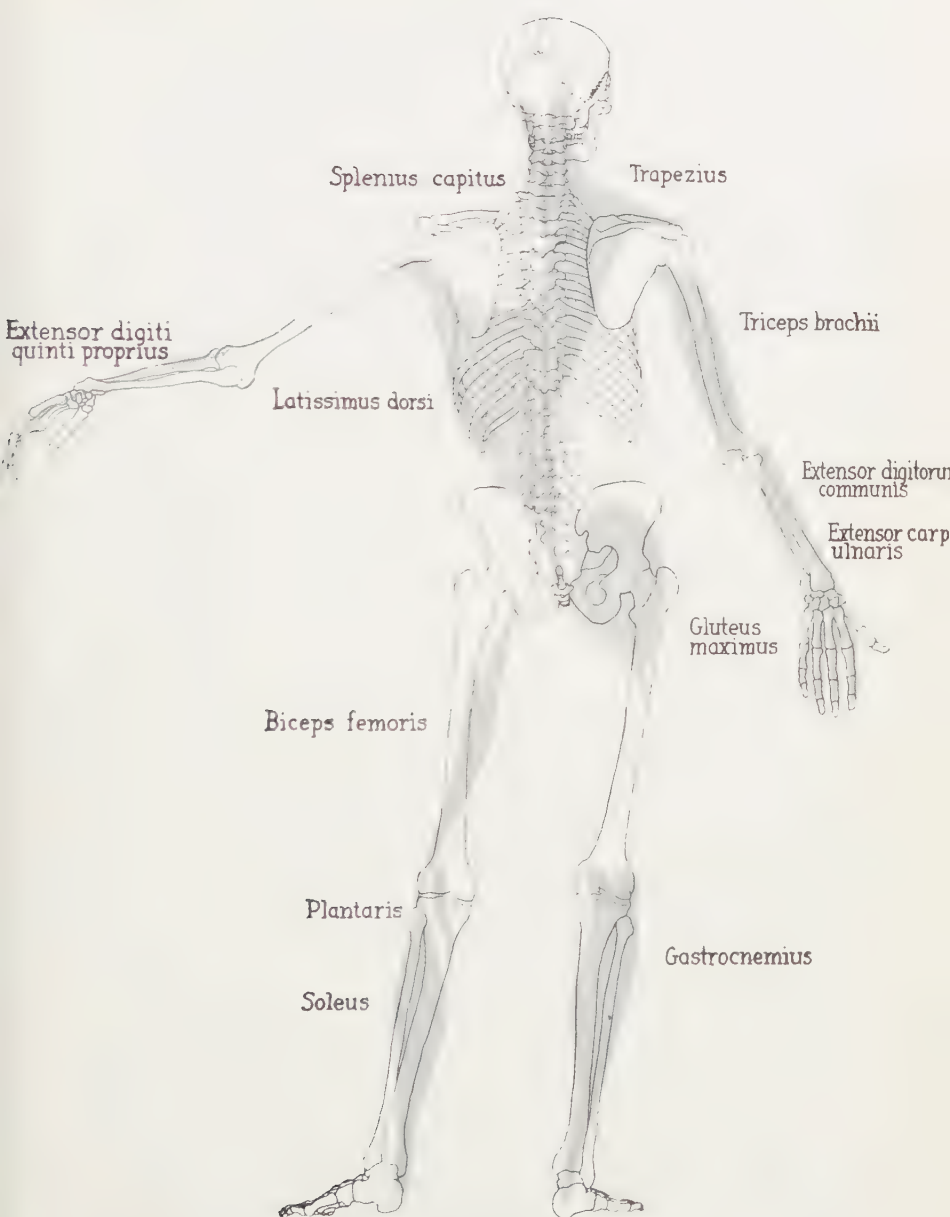


FIG. 72.—Projection of muscles on posterior view of skeleton showing attachments.

MUSCLES SHOWN IN FIG. 73

MUSCLE	ORIGIN	INSERTION	ACTION
Extensor carpi radialis brevis	Lateral epicondyle of humerus	2nd and 3rd metacarpals	Extends hand and abducts wrist
Extensor carpi radialis longus	Lateral epicondylar ridge of humerus	Second metacarpal	Extends and abducts hand; flexes forearm
Flexor digitorum longus	Middle three-fifths dorsal surface of tibia	Phalanges of four lateral toes	Flexes digits; extends and inverts foot
Gluteus medius	Lateral surface of ilium	Great trochanter of femur	Abducts thigh; medial rotator of thigh
Gluteus minimus	Lateral surface of ilium	Great trochanter of ilium	Abducts thigh; medial or lateral rotator of extended limb
Infraspinatus	Infraspinous fossa of scapula	Greater tubercle of humerus	Rotates arm laterally
Levator scapulae	First three or four cervical vertebrae	Vertebral border of scapula between medial angle and root of spine	Rotates inferior angle of scapula medially; elevates shoulder
Popliteus	Lateral condyle of femur	Proximal fifth of tibia	Flexes knee; rotates leg medially
Rhomboides major	Upper 2, 3, 4, 5th thoracic vertebrae	Vertebral border of scapula	Rotates inferior angle of scapula medially; elevates shoulder; approximates the two scapulae
Rhomboides minor	Nuchal ligament, 7th cervical and first thoracic vertebrae	Vertebral border of scapula	Rotates inferior angle of scapula medially; elevates shoulder; approximates the two scapulae
Sacrospinalis	Dorsal surface of sacrum, spines of lumbar vertebrae, crest of ilium; divides into several groups of muscles	Lumbar, thoracic, cervical vertebrae; ribs; and mastoid process	Extends vertebral column and head; bends vertebral column and head to side; numerous complex actions of vertebral column
Semimembranosus	Ischial tuberosity	Medial condyle of tibia	Flexes leg and rotates it medially; extends and adducts thigh; rotates it medially
Semitendinosus	Ischial tuberosity	Medial surface of tibia	Flexes knee and rotates it medially; extends and adducts thigh; rotates it medially
Supraspinatus	Supraspinous fossa of scapula	Greater tubercle of humerus	Assists in abduction of arm
Teres major	Axillary border of scapula	Intertubercular sulcus of humerus	Adducts, extends and rotates arm medially
Teres minor	Axillary border of scapula	Greater tubercle of humerus	Adductor and lateral rotator of arm
Tibialis posterior	Posterior surface of tibia, fibula, and interosseous membrane	Navicular, cuboid, all cuneiform bones, second to fourth metatarsals	Adducts, extends and inverts foot; (assists in the maintenance of arch of foot)

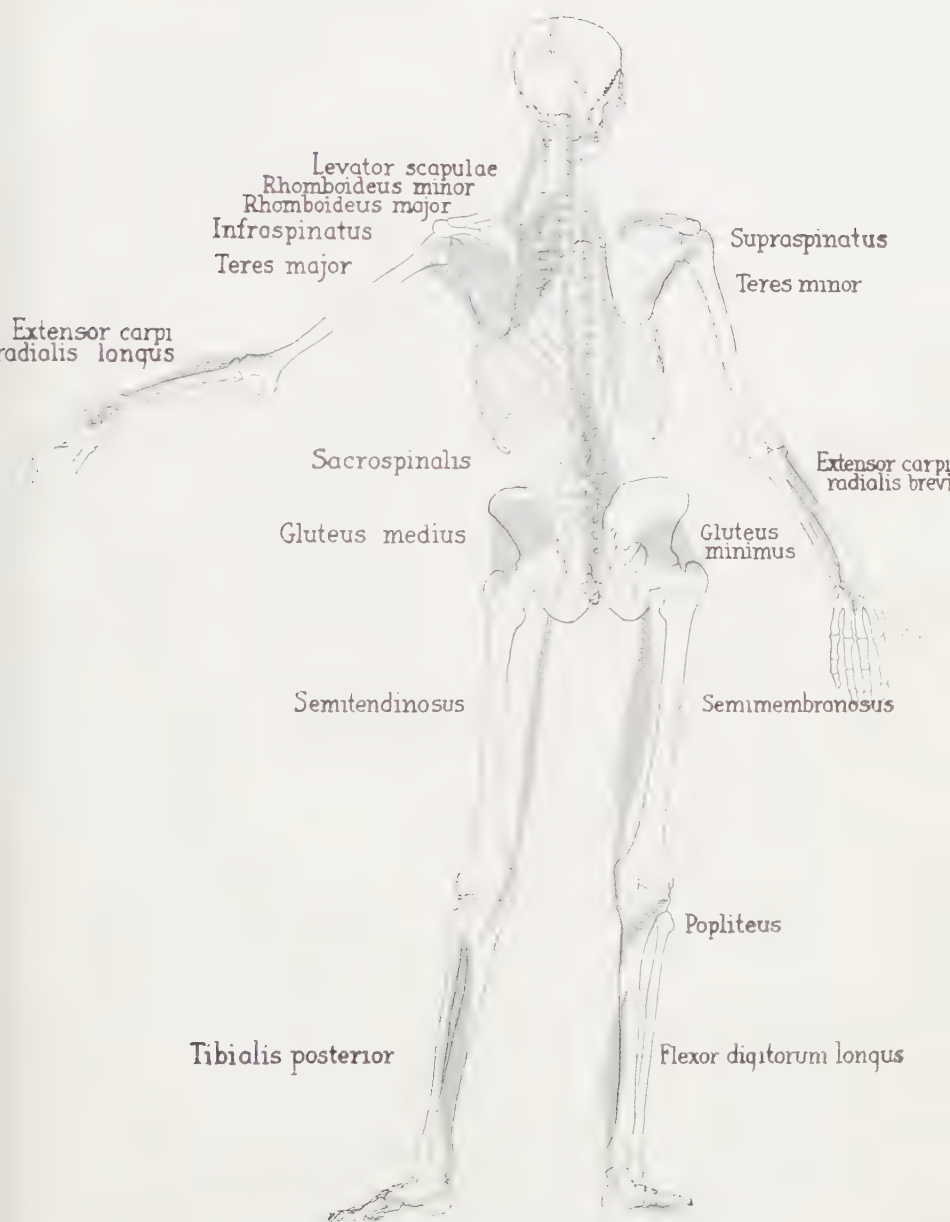


FIG. 73.—Projection of muscles on posterior view of skeleton showing attachments.

MUSCLES SHOWN IN FIG. 74

MUSCLE	ORIGIN	INSERTION	ACTION
Abductor pollicis longus	Dorsal surface of ulna, radius, and interosseous membrane	Base of first metacarpal	Abducts and extends thumb Muscles Shown in Fig. 74
Anconeus	Lateral epicondyle of humerus	Olecranon of ulna	Extends forearm
Deltoides	Lateral third clavicle; acromion, and inferior edge of spine of scapula	Deltoid tubercle of humerus	Abducts arm; anterior part flexes and rotates arm medially; posterior part extends and rotates arm laterally
Flexor hallucis longus	Distal two-thirds of fibula	Terminal phalanx of great toe	Flexes great toe; extends and inverts foot
Peroneus longus	Head and body of fibula, lateral condyle of tibia	By tendon passing behind lateral malleolus and across sole of foot to first cuneiform and first metatarsal	Supports transverse arch of foot; extends, abducts, and everts foot
Rectus abdominis	Symphysis and crest of pubis	Xiphoid process and 5-7 ribs	Draws thorax downward; flexes vertebral column and pelvis, supports abdominal viscera
Temporalis	Temporal fossa of temporal bone	Coronoid process of mandible	Raises mandible
Tensor fasciae latae	Anterior superior spine and anterior part iliac crest	Iliotibial tract	Tenses fascia lata; abducts and rotates thigh medially
Trapezius	Occipital bone, nuchal ligament, seventh cervical and all thoracic vertebrae	Lateral third of clavicle, acromion and lateral part of spine of scapula	Rotates inferior angle of scapula laterally and forwards; elevates lateral end of clavicle, of scapula; approximates the scapulae; extends the head

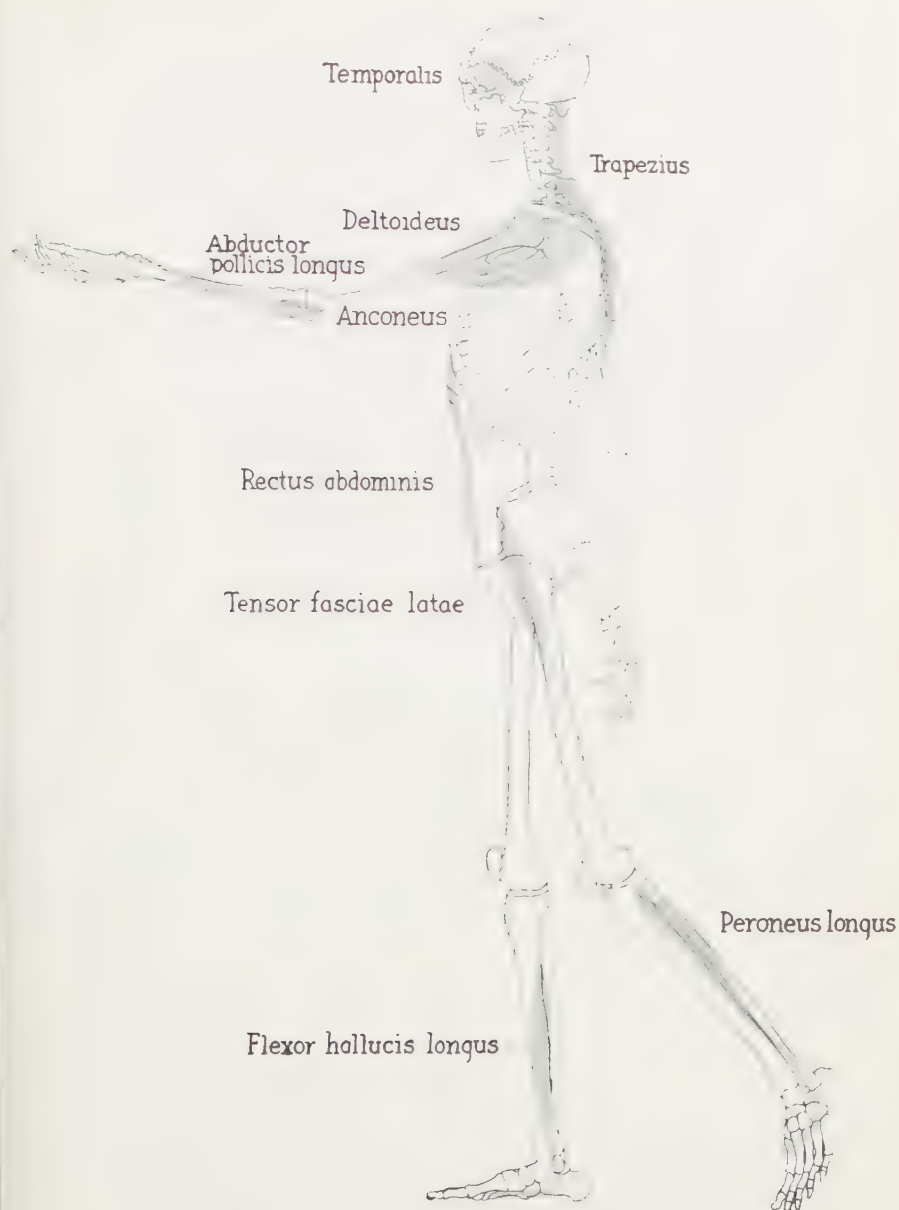


FIG. 74.—Projection of muscles on lateral surface of skeleton showing attachments.

CHAPTER VII

MUSCLES OF THE HEAD AND NECK

MUSCLE	ORIGIN	INSERTION	ACTION
Auricularis anterior	Temporal fascia	Cartilage of ear	Draws ear forward
Auricularis superior	Epicranial aponeurosis	Cartilage of ear	Draws ear upward
Buccinator	Maxilla, mandible	Orbicularis oris muscle	Retracts angle of mouth and flattens lips and cheek against teeth
Caninus	Canine fossa of maxilla	Orbicularis oris muscle and skin	Raises angle of mouth
Corrugator	Frontal bone	Skin of eyebrow	Draws inner angle of eyebrow downward and wrinkles forehead
Epicranius Frontalis	Epicranial aponeurosis	Skin of eyebrow. Root of nose	Elevates eyebrow, wrinkles forehead
Occipitalis	Superior nuchal line of occipital bone	Epicranial aponeurosis	Draws scalp backward, and tenses epicranial aponeurosis
Incisivus labii inferior and superior (not visible)	Maxilla and mandible	Orbicularis oris muscle	Draws corners of lips medially
Masseter	Zygomatic arch	Lateral surface of ramus of mandible and coronoid process	Raises mandible and draws it forward
Mentalis	Mandible, below the lateral incisor tooth	Skin of chin	Draws up skin of chin
Nasalis	Maxilla and dorsum of nose	Margin of nostril and skin of nasolabial groove	Constricts nostrils; draws wings of nose laterally and upward
Orbicularis oculi	Maxilla, frontal bone, and medial palpebral ligament	There is no bony insertion. The muscle fibres form a complete ellipse and terminate at the origin	Closes eye; draws eyelid towards median line; stretches skin of forehead
Orbicularis oris	Various muscles converging into the mouth	No bony insertion. Skin of lips	Draws lips together; helps in infinite variety of facial expressions as joy, grief, despair, etc.
Platysma	Fascia covering pectoralis major and deltoid muscles	Inferior border of mandible; risorius muscle in corner of mouth	Depresses angle of mouth; wrinkles skin of neck in oblique direction across lower jaw
Procerus	Membrane of bridge of nose	Skin over root of nose	Draws skin of forehead down
Quadratus labii inferioris	Mandible below canine and premolar teeth	Lower lip	Draws lower lip downward
Quadratus labii superioris	<i>Angular head:</i> frontal process of maxilla (root of nose) <i>Infraorbital head:</i> maxilla <i>Zygomatic head:</i> zygomatic bone near orbicularis oculi	<i>Angular head:</i> alar cartilage of nose and orbicularis oris <i>Infraorbital head:</i> orbicularis oris and skin upper lip <i>Zygomatic head:</i> skin of upper lip	Helps in variety of facial expressions
Risorius	Continuation of platysma, subcutaneous tissue over parotid gland	Skin and mucous membrane at corner of mouth	Draws corner of mouth laterally
Triangularis	Mandible below canine, premolar and first molar teeth	Orbicularis oris muscle and skin	Draws corner of mouth downward
Zygomaticus	Zygomatic bone	Partly in skin about angle of mouth; partly into the orbicularis oris	Draws upper lip upward as in laughing; aids in other facial expressions

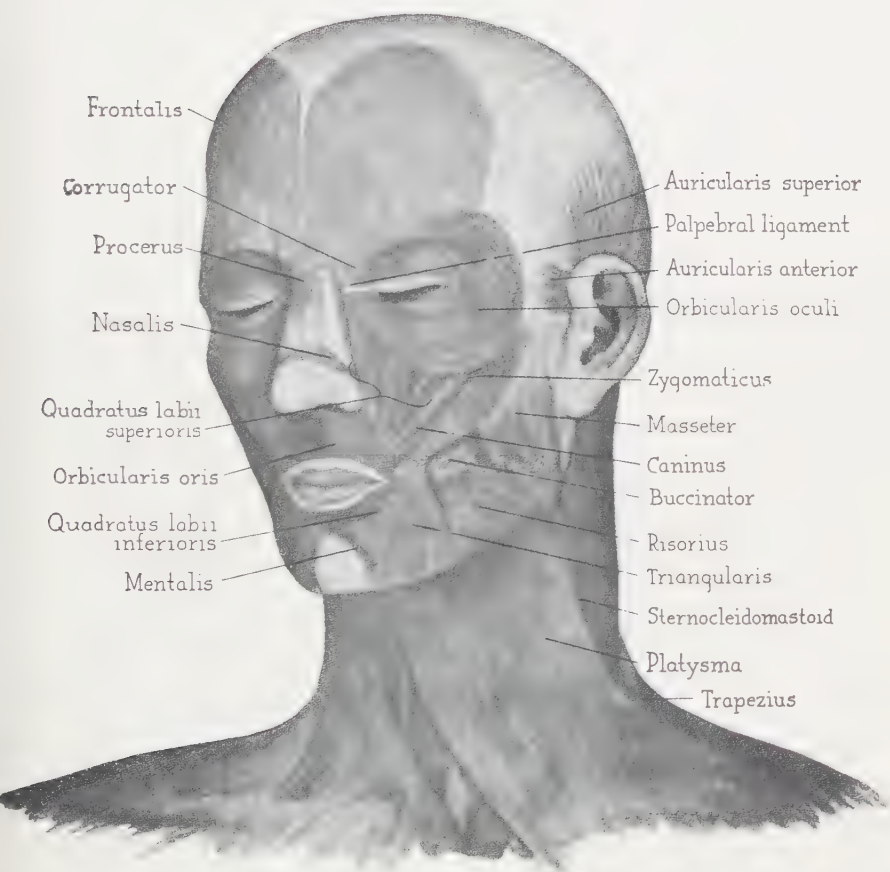


FIG. 75.—Muscles of the face and head, viewed from the left.

THE ANATOMY OF THE SMILE

The famous "Mona Lisa Gioconda" of Leonardo da Vinci illustrates an expression of elusiveness—with a delightful smile exceedingly difficult to analyze.

The following changes are evident in the smiling face:

1. The face becomes broader.
2. The upper lip and corner of the mouth are retracted upward and lateralward by the action of the zygomaticus and the quadratus labii superioris.
3. The contraction of the above mentioned muscles causes a smooth roundness under the eye, which results in a furrow under the eye.
4. The naso-labial groove becomes shallower and broader.
5. There is practically no action of the frontalis or corrugator muscles on the forehead.

From an anatomical point of view, the above mentioned facts create a smile. Yet, what would this masterpiece be without Leonardo's power of expression—his Art telling a story, or hundreds of stories through Mona Lisa's famous eyes?



FIG. 76.—“Mona Lisa.”

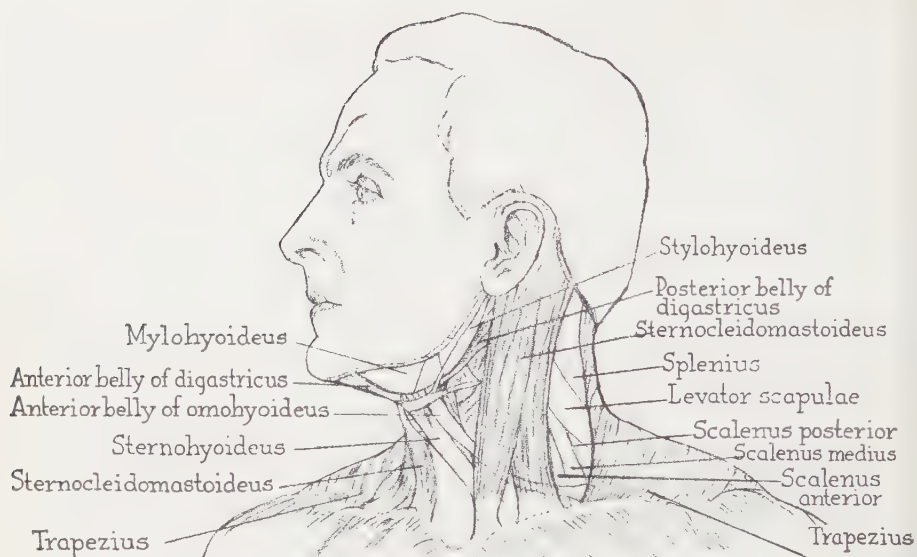


FIG. 77.—Labeled sketch of the muscles of the neck.



FIG. 78.—Muscles of the neck.

CHAPTER VIII

MUSCULAR LANDMARKS OF THE HUMAN FIGURE

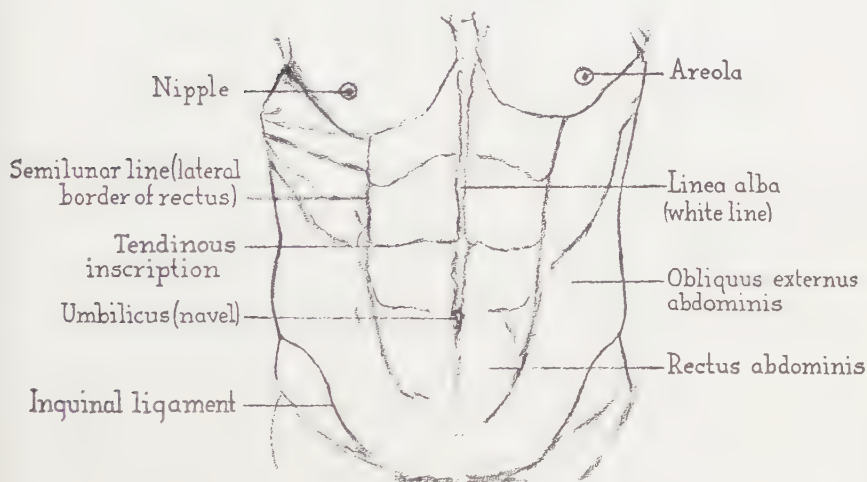


FIG. 79.—Labeled sketch of the abdominal muscles.

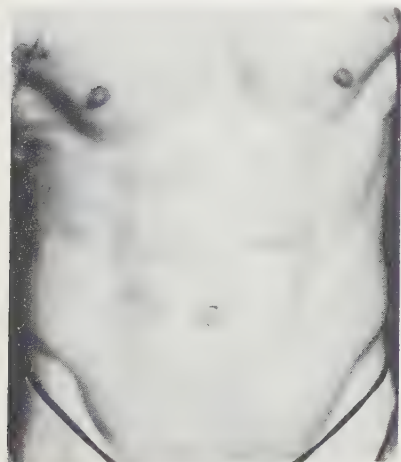


FIG. 80.—The abdominal muscles slightly contracted.

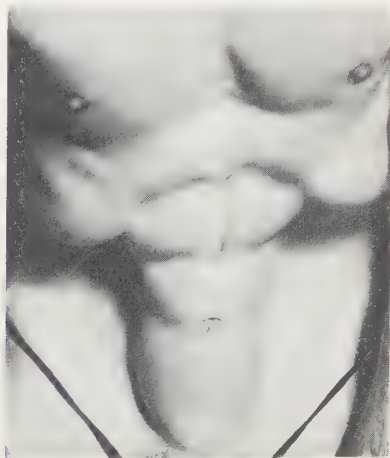


FIG. 81.—The abdominal muscles fully contracted.



FIG. 82.—Axilla and shoulder, anterior view, arms overhead.

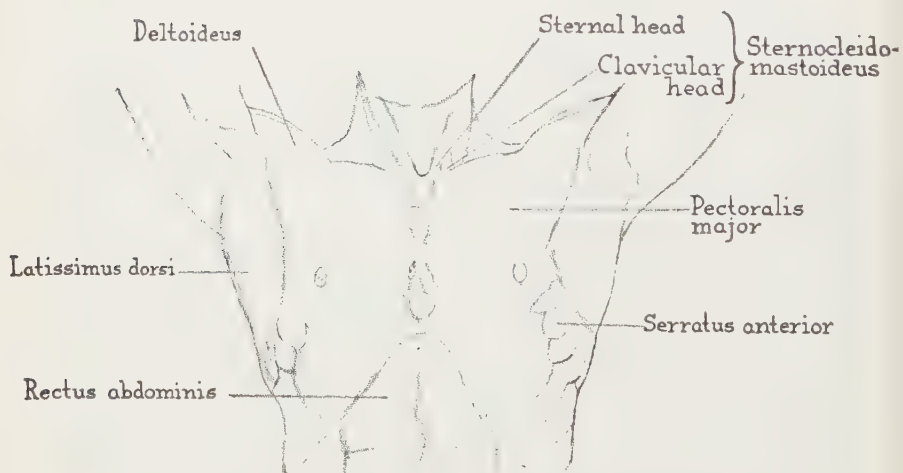


FIG. 83.—Labeled sketch of muscles shown in Fig. 82.

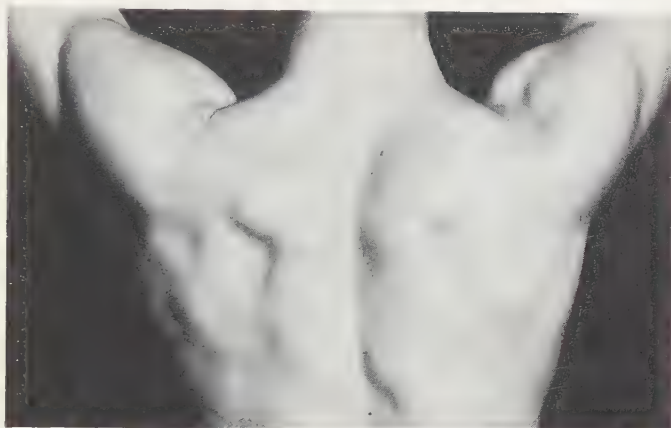


FIG. 84.—Shoulder and scapular region, posterior view, arms overhead.

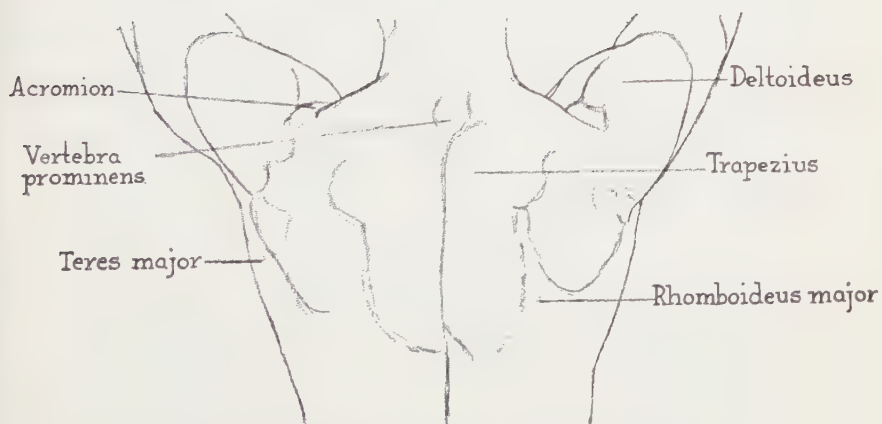


FIG. 85.—Labeled sketch of muscles shown in Fig. 84.

AXILLA AND SHOULDER FROM THE FRONT

The axilla is the hollow or armpit between the proximal part of the arm and the side of the thorax. The axilla is bounded in front by the two pectoral muscles, the major forming a beautiful border in figure 86; while behind, the latissimus dorsi, teres major and subscapularis form the thick rounded margin. The lateral or outer boundary is formed by the biceps brachii and the coraco-brachialis. The inner wall is formed by the distinct digitations of the serratus anterior and their ribs.

SHOULDER AND SCAPULAR REGION FROM BEHIND

The bony points visible in Fig. 87 are: (1) the spine of the scapula, (2) the acromion process of the scapula, (3) the prominent seventh cervical vertebra, and (4) the inferior angle of the scapula.

The prominent muscular elevations are (1) trapezius, (2) deltoideus, (3) latissimus dorsi, (4) rhomboideus major.

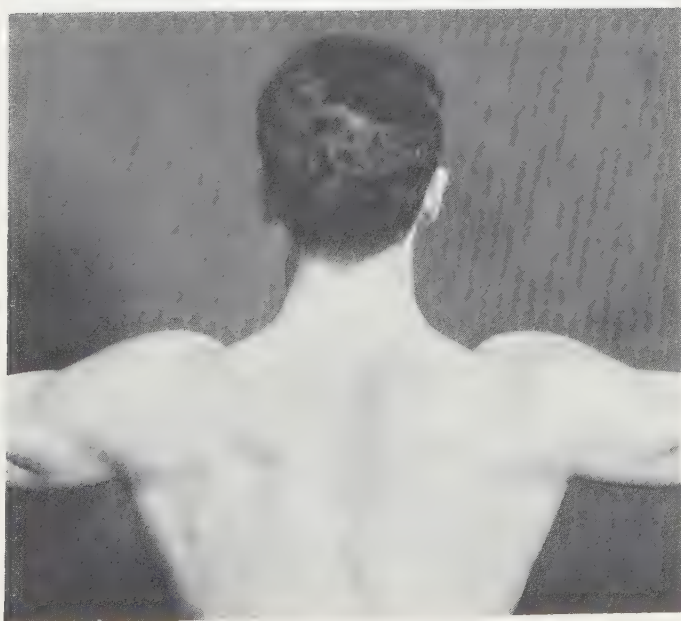
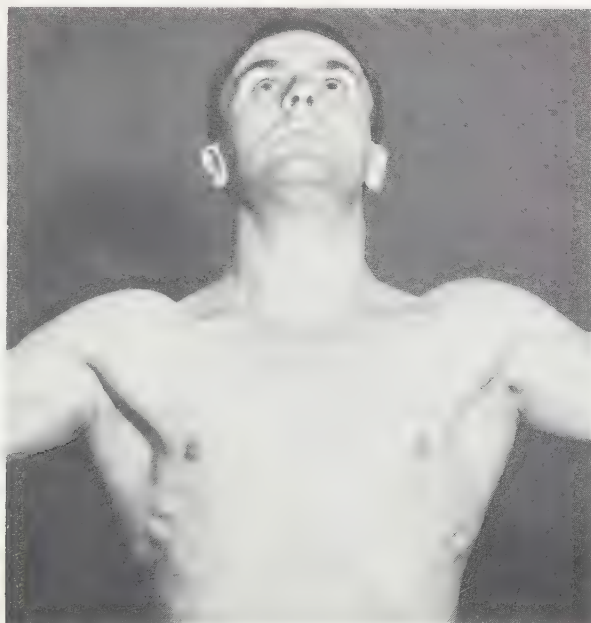


FIG. 87.—Shoulder and scapular region, arms abducted about 90° .

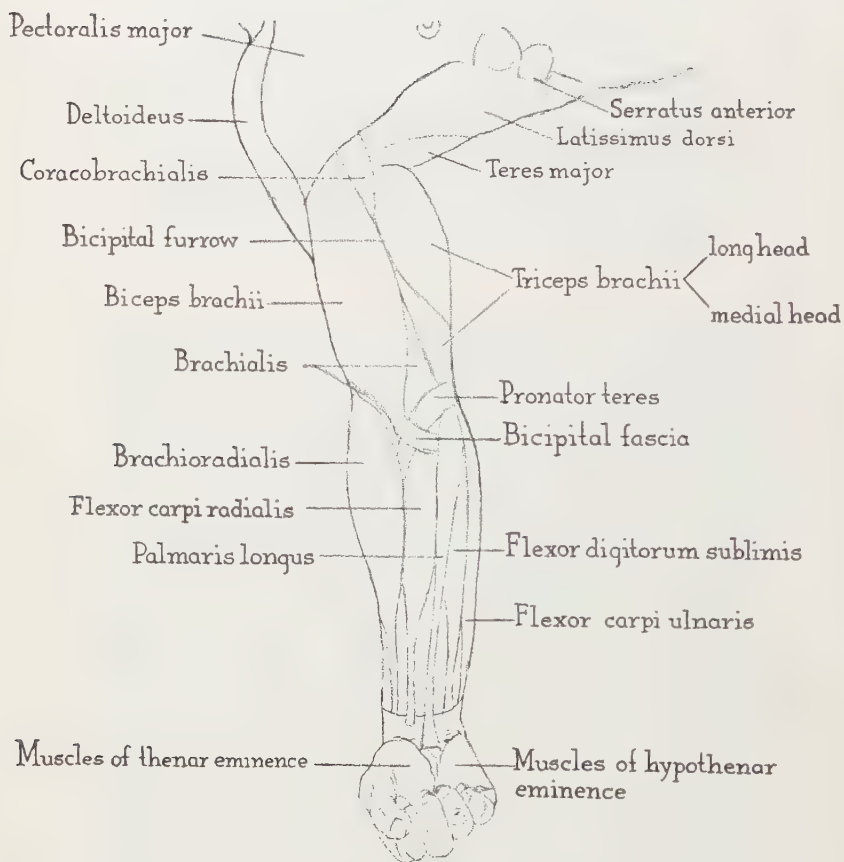


FIG. 88.—Labeled sketch of muscles shown in Fig. 89.

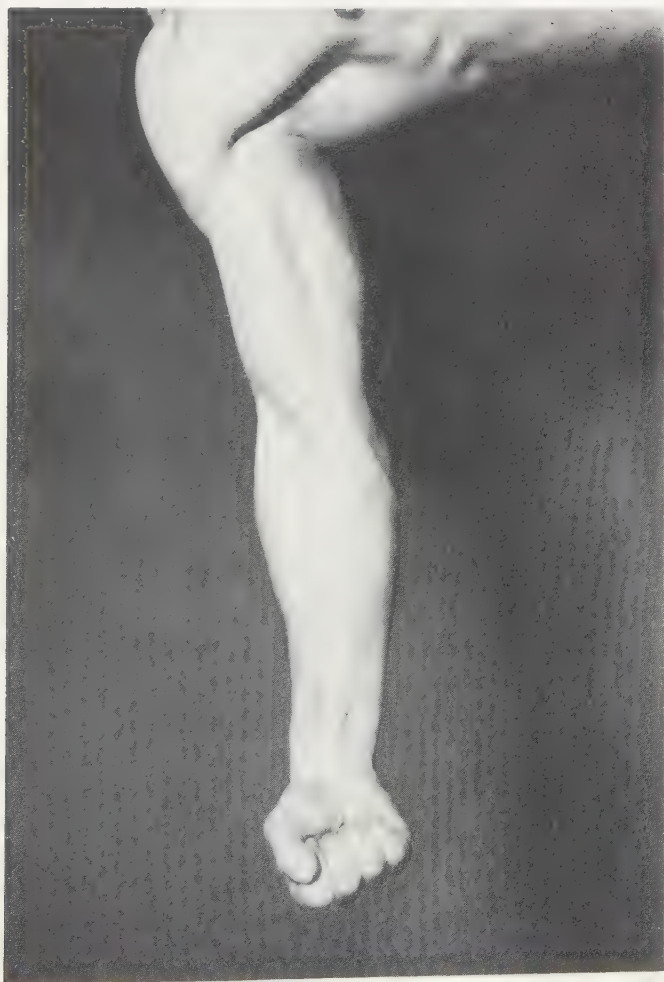


FIG. 89.—The upper right extremity abducted and supinated.

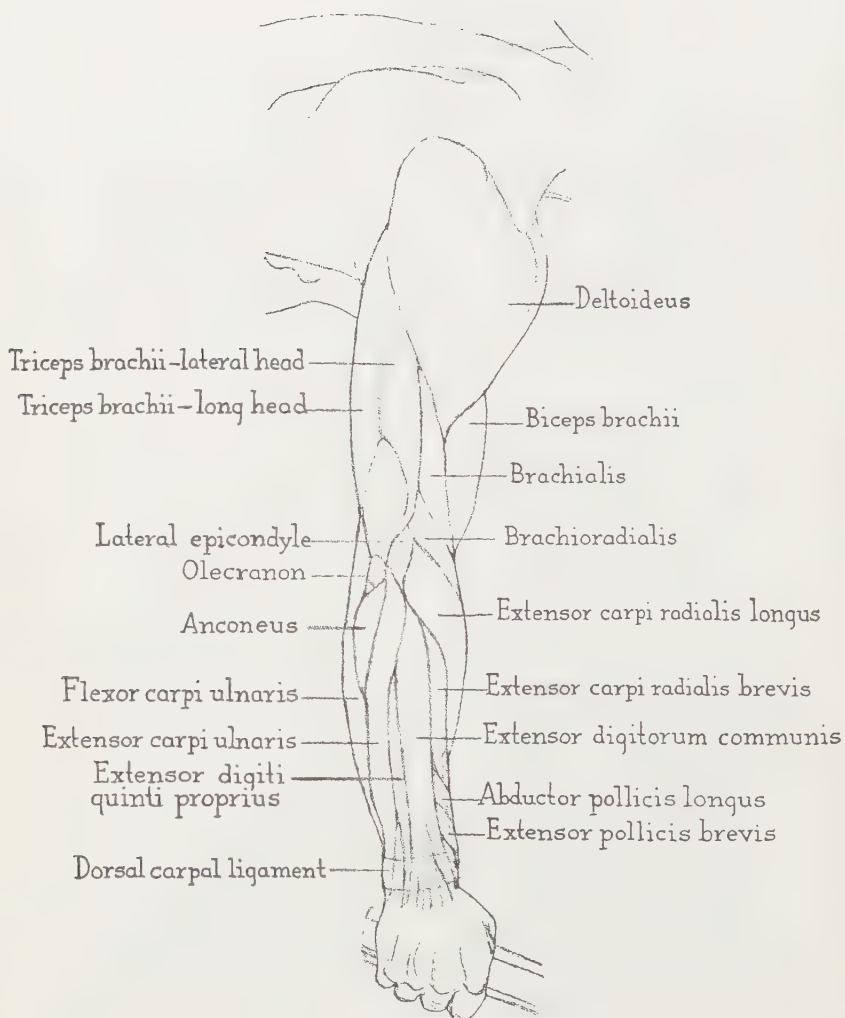


FIG. 90.—Labeled sketch of the upper right extremity, posterior view.



FIG. 91.—The upper right extremity, posterior view.

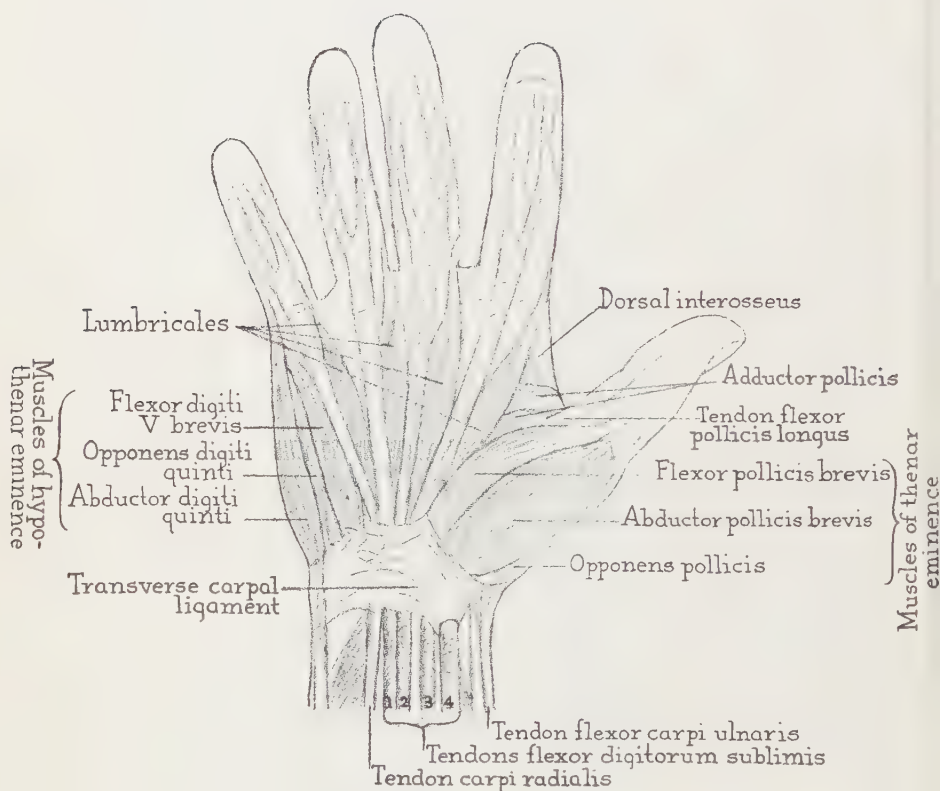


FIG. 92.—Labeled sketch of the palmar view of the hand.



FIG. 93.—The hand, palmar view. (See page 149 for other details regarding the hand.)

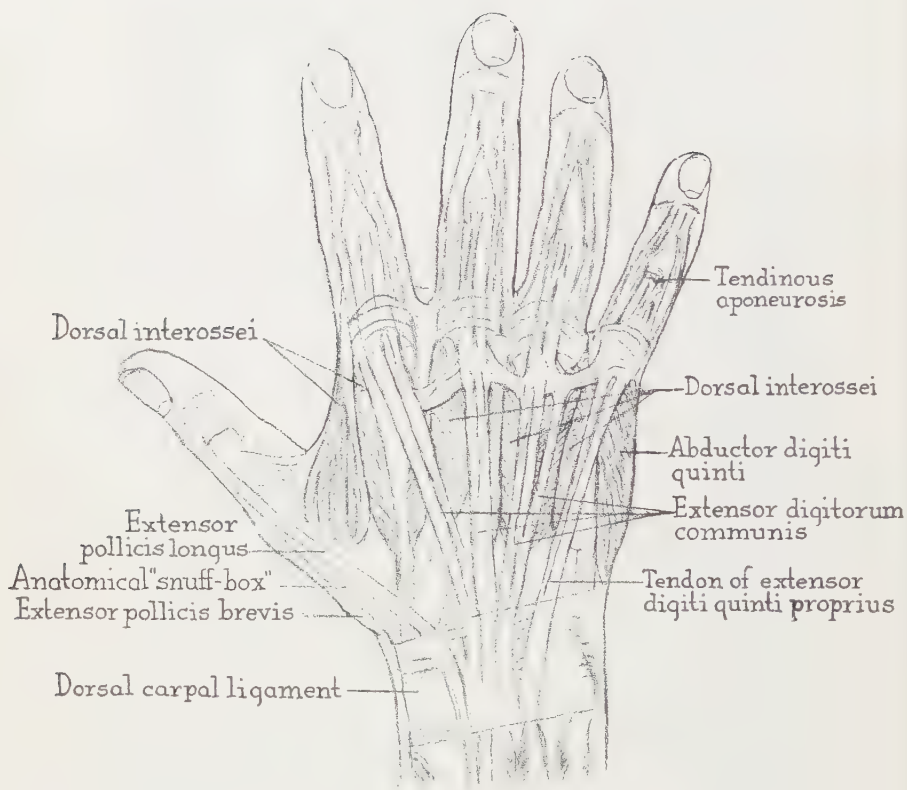


FIG. 94.—Labeled sketch of the posterior view of the hand.



FIG. 95.—The hand, posterior view, the superficial veins are quite visible.

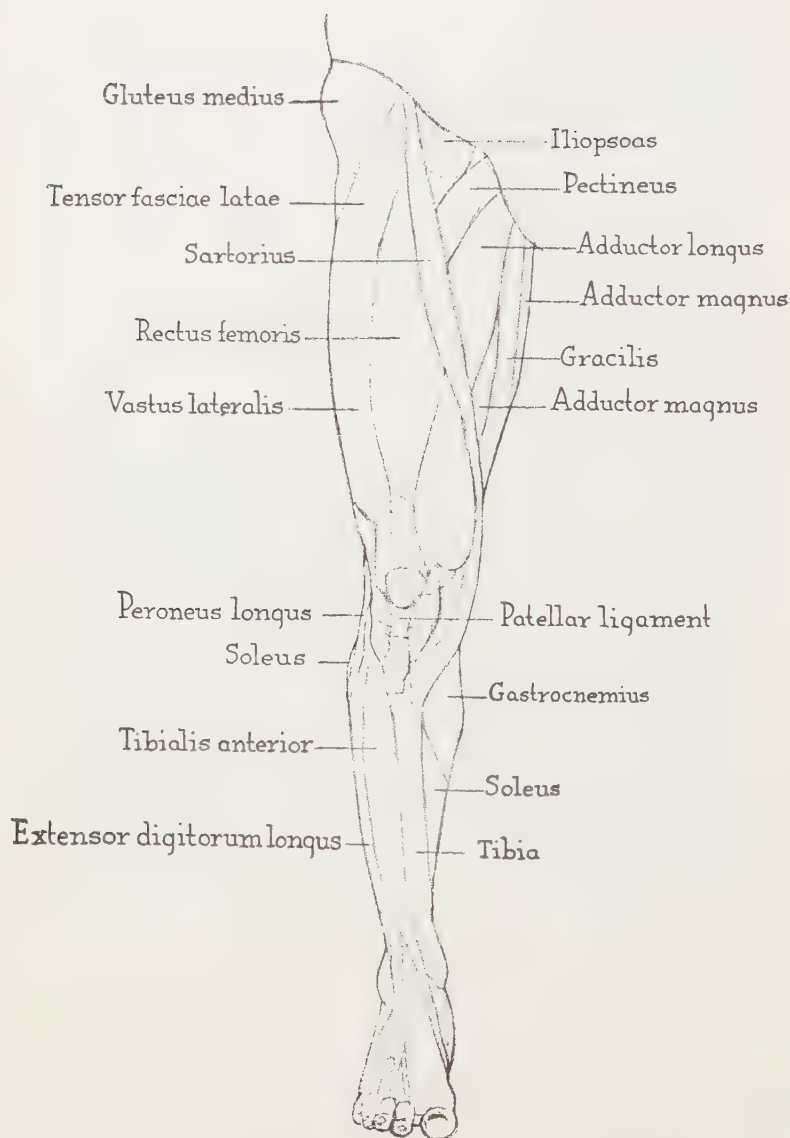


FIG. 96.—Labeled sketch of the lower right extremity, anterior view.



FIG. 97.—The lower right extremity, anterior view.

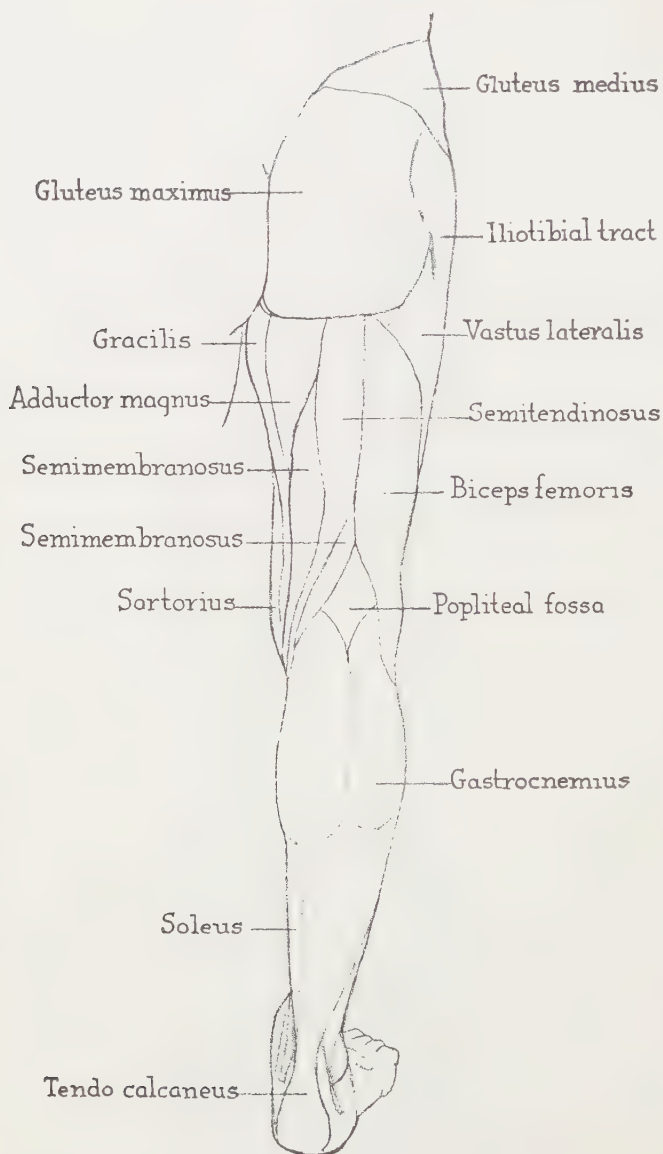


FIG. 98.—Labeled sketch of the lower right extremity, posterior view.



FIG. 99.—The lower right extremity, posterior view.

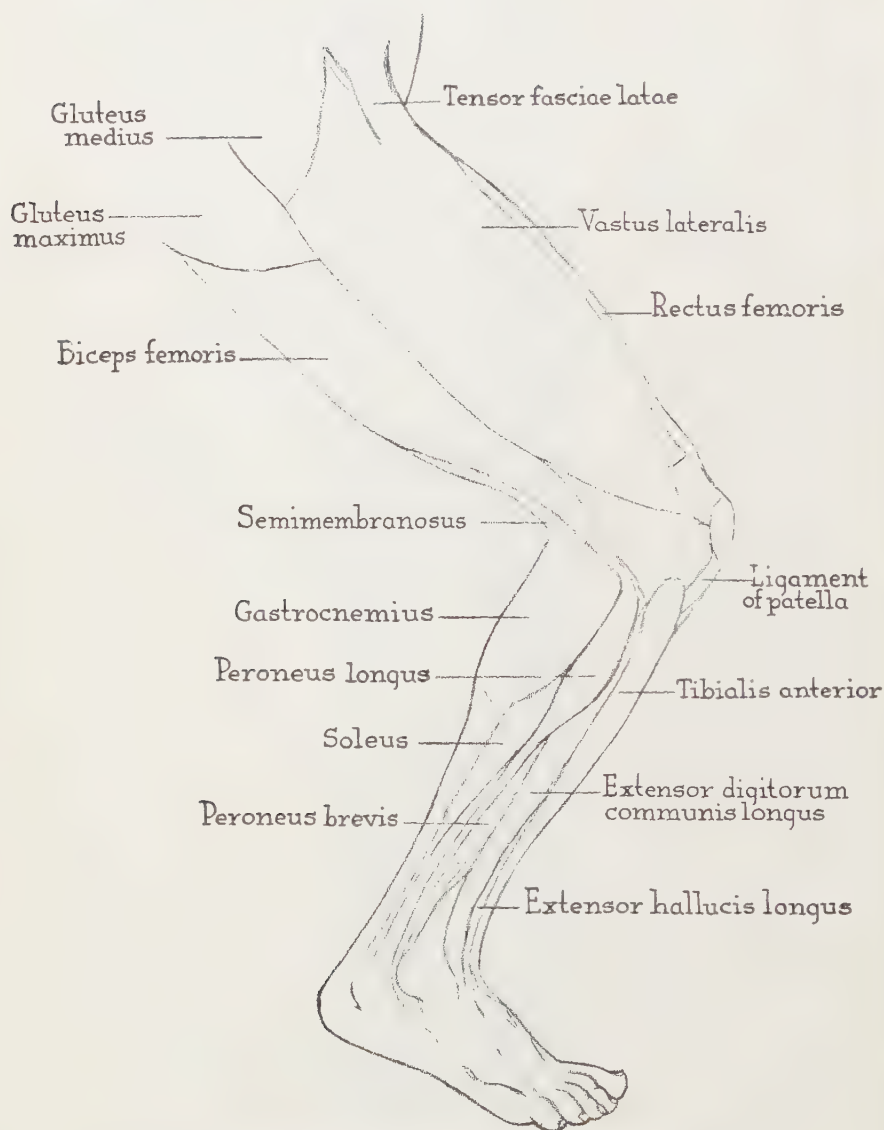


FIG. 100.—Labeled sketch of the lower right extremity shown in Fig. 101.



FIG. 101.—The lower right extremity partly flexed, lateral external view.

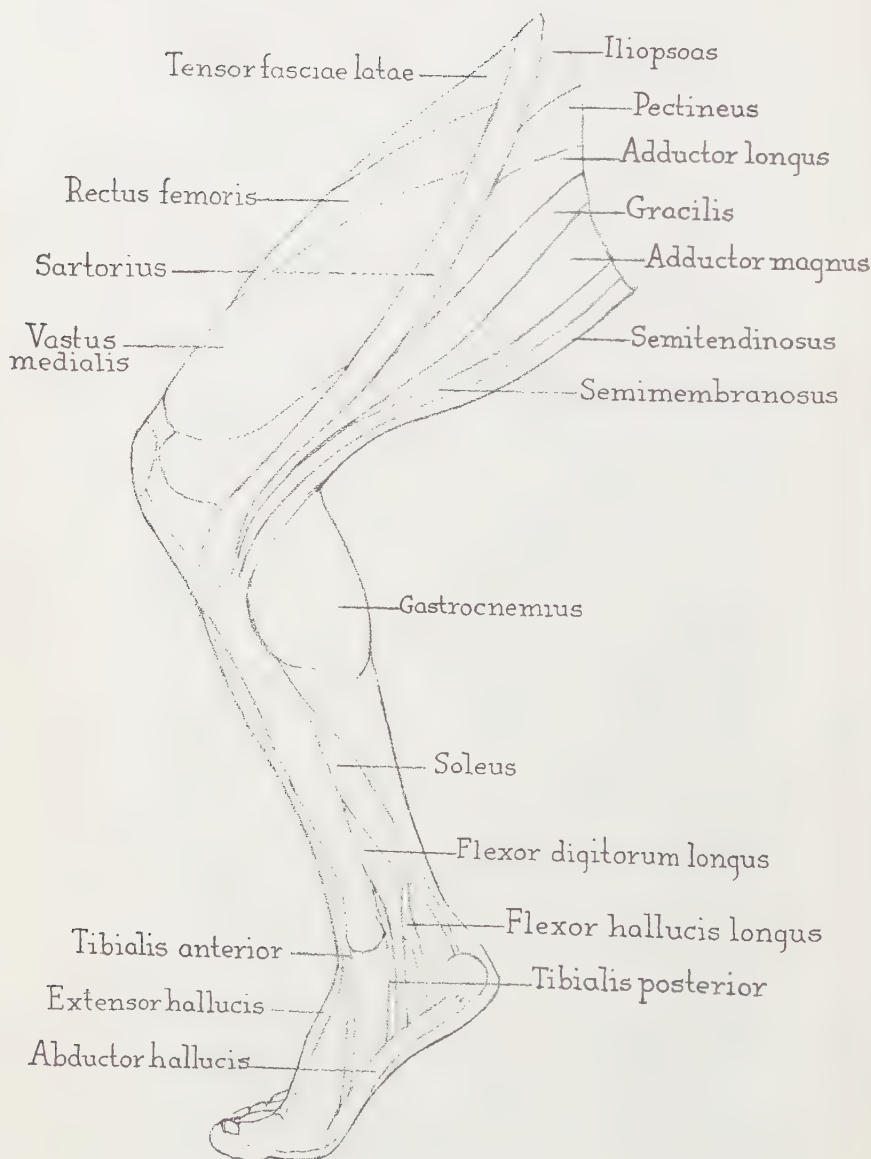


FIG. 102.—Labeled sketch of the lower right extremity shown in Fig. 103.



FIG. 103.—The lower right extremity partly bent, internal view.

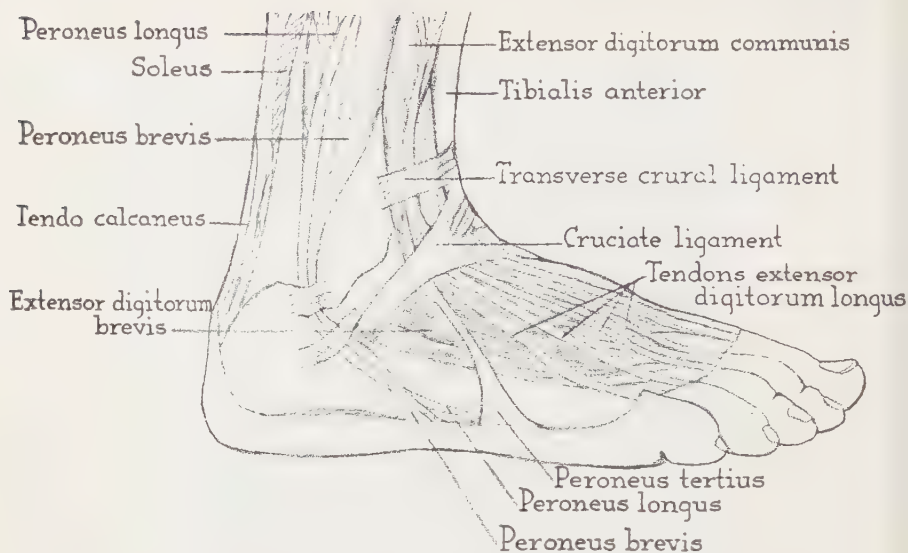


FIG. 104.—Labeled sketch of the right foot, external lateral view.



FIG. 105.—The right foot, external lateral view.

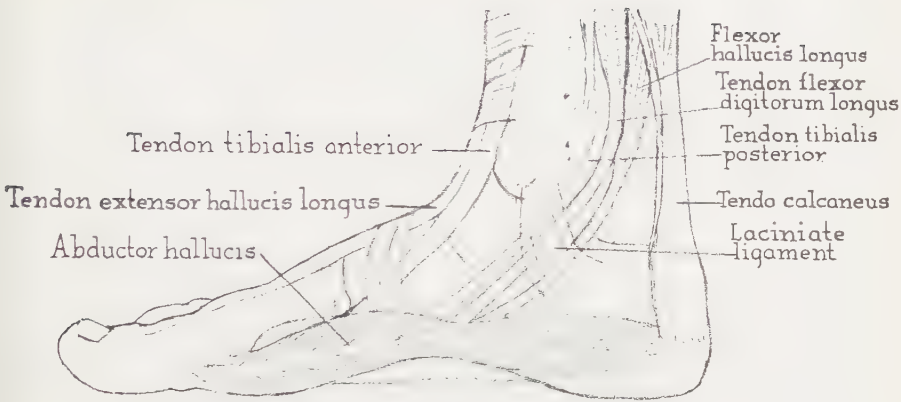


FIG. 106.—Labeled sketch of the right foot, internal view.



FIG. 107.—The right foot, internal view.

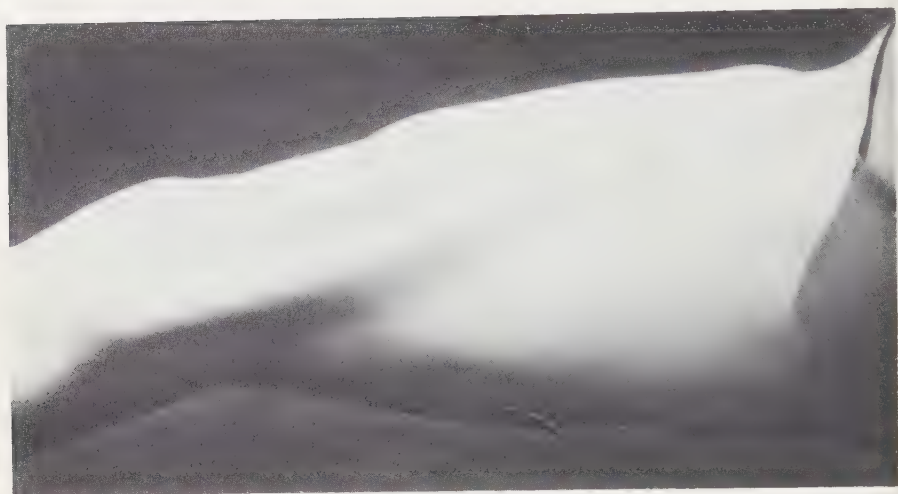


FIG. 108.—Demonstration of sartorius muscle.

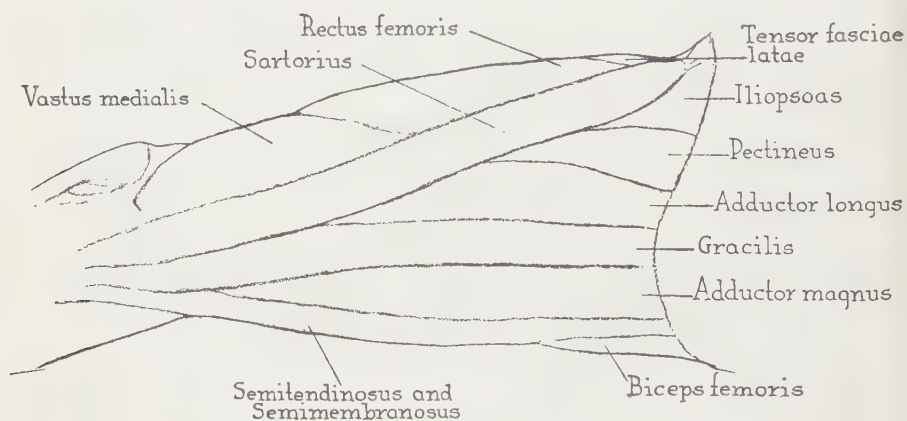


FIG. 109.—Labeled sketch of the sartorius muscle.

CHAPTER IX

MUSCLES GROUPED ACCORDING TO THEIR PRINCIPAL ACTION

Muscles of the Head.

MUSCLES AFFECTING THE ORAL ORIFICE.

Retractors downward: platysma, triangularis, and quadratus labii inferioris.

Retractors upward: quadratus labii superioris, zygomaticus, caninus.

Retractors lateralward: zygomaticus, platysma, risorius, triangularis, buccinator.

Contractors: orbicularis oris (incisivus labii superioris and inf.).

MUSCLES AFFECTING THE ORBIT.

Retractors: epicranii, levator palpebrae (raises eyelid).

Contractors: orbicularis oculi, procerus, corrugator.

MUSCLES AFFECTING THE NASAL ORIFICE.

Dilators: quadratus labii superioris (angular head), nasalis (transverse head).

Contractors: nasalis (alar portion), depressor septi nasi.

MUSCLES AFFECTING THE EAR.

Retractors: auricularis anterior, superior, and posterior.

MUSCLES ACTING IN MASTICATION (chewing).

Masseter, temporalis, pterygoideus externus and internus.

Muscles acting on the Head.

Sternocleidomastoideus, trapezius, splenius capitis, supra- and infrahyoids.

Muscles acting on the Spine.

Sternocleidomastoideus, psoas major, rectus abdominis, obliquus externus and internus, sacrospinalis, levator scapulae, and splenius capitis.

Muscles acting on the Shoulder-girdle.

Elevation: levator scapulae, trapezius, rhomboideus major and minor.

Depression: pectoralis minor, latissimus dorsi, subclavius, lower parts of trapezius and pectoralis major.

Abduction: pectoralis major and minor, serratus anterior.

Adduction: latissimus dorsi, rhomboideus major and minor, trapezius.

Muscles acting on the Arm at the Shoulder-joint.

Abduction: supraspinatus, deltoideus.

Adduction: latissimus dorsi, teres major, pectoralis major, coraco-brachialis.

Inward rotation: subscapularis.

Outward rotation: teres minor, infraspinatus.

Flexion: pectoralis major, clavicular part of deltoideus, coraco-brachialis, serratus anterior, short head of biceps.

Extension: latissimus dorsi, teres major, posterior part of deltoideus.

Muscles acting on the Forearm.

Flexion: brachioradialis, biceps brachii, brachialis.

Extension: triceps, and anconeus.

Pronation: pronator teres, pronator quadratus.

Supination: supinator.

Muscles acting on the Hand at the Wrist.

Flexion: flexor carpi radialis, flexor carpi ulnaris, palmaris longus.

Extension: extensor carpi radialis longus and brevis, extensor carpi ulnaris.

Muscles acting on the Pelvis.

Flexion: rectus abdominis, obliquus externus and internus, psoas major.

Extension: sacrospinalis.

Lateral flexion: rectus abdominis, obliquus externus and internus.

Muscles acting on the Thigh at the Hip-joint.

Flexion: iliopsoas.

Extension: gluteus maximus.

Adduction: gracilis, pectineus, adductors brevis, longus, and magnus.

Abduction: gluteus medius and minimus, tensor fasciae latae.

Inward rotation: gluteus medius and minimus, tensor fasciae latae.

Outward rotation: quadratus femoris, piriformis, gemelli, obturators.

Muscles acting on the Leg at the Knee-joint.

Flexion: sartorius, semitendinosus, semimembranosus, biceps, popliteus.

Extension: quadriceps femoris composed of the following four muscles: rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius.

Muscles acting on the Foot at the Ankle-joint.

Flexion: tibialis anterior.

Extension: gastrocnemius, plantaris, soleus.

CHAPTER X

SKIN, FASCIAE, AND FAT

The skin or integument covers the whole body. It serves as an organ of protection, and assists in regulating body temperature. The colour of this elastic tissue is due chiefly to pigment, and partly to the blood. The skin is yellowish in old age, and pinkish in childhood. The hair and nails are both derivatives of the skin.

The surface of the body presents lines and ridges well marked on the palm of the hand and the sole of the foot. The coarser and more conspicuous rather thick lines are flexure lines, while the finer markings are the papillary ridges, as illustrated in figure 145. The palmist examines the flexure lines in the exercise of his calling, while the criminologist is able to detect, register and identify individuals by the papillary ridge pattern. A flexure line marks the site of "a skin joint," a folding point of the skin and subcutaneous tissue.

Beneath the skin there are two layers of tissue that are in close relation to the muscular system: (1) the superficial fascia, with its fat, and (2) the deep fascia.

The **superficial fascia** covers the entire body immediately under the skin. It is impregnated usually with fat, more especially in the regions indicated in Figs. 112, 116, 120. **Fat** reduces the irregularities of the underlying bones and muscles, especially in the female, to form smooth, round, graceful curves. If the model is well nourished examination of the surface does not reveal much information, for the entire superficial fascia is well loaded with fat, which obscures the prominences and bulging made by bones, muscles and tendons, rendering their identification difficult even under digital examination.

The **deep fascia** lies underneath the skin and superficial fascia. It is a bluish white membrane, devoid of fat, which covers and invests the muscles, ligaments, and parts of the skeleton. It is attached to all subcutaneous bony prominences.

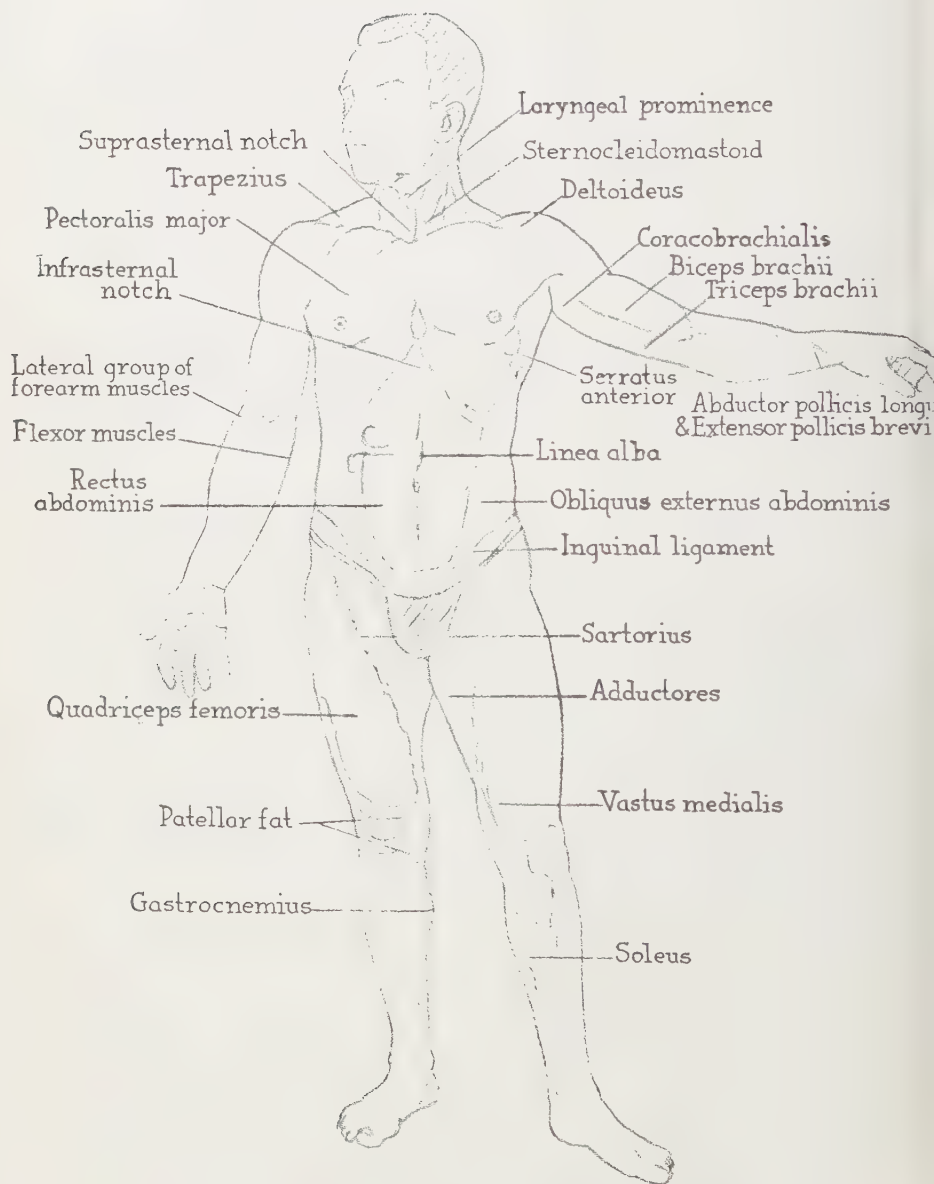


FIG. 110.—Key to muscular projections, anterior view.



FIG. 111.—Male figure, anterior view.

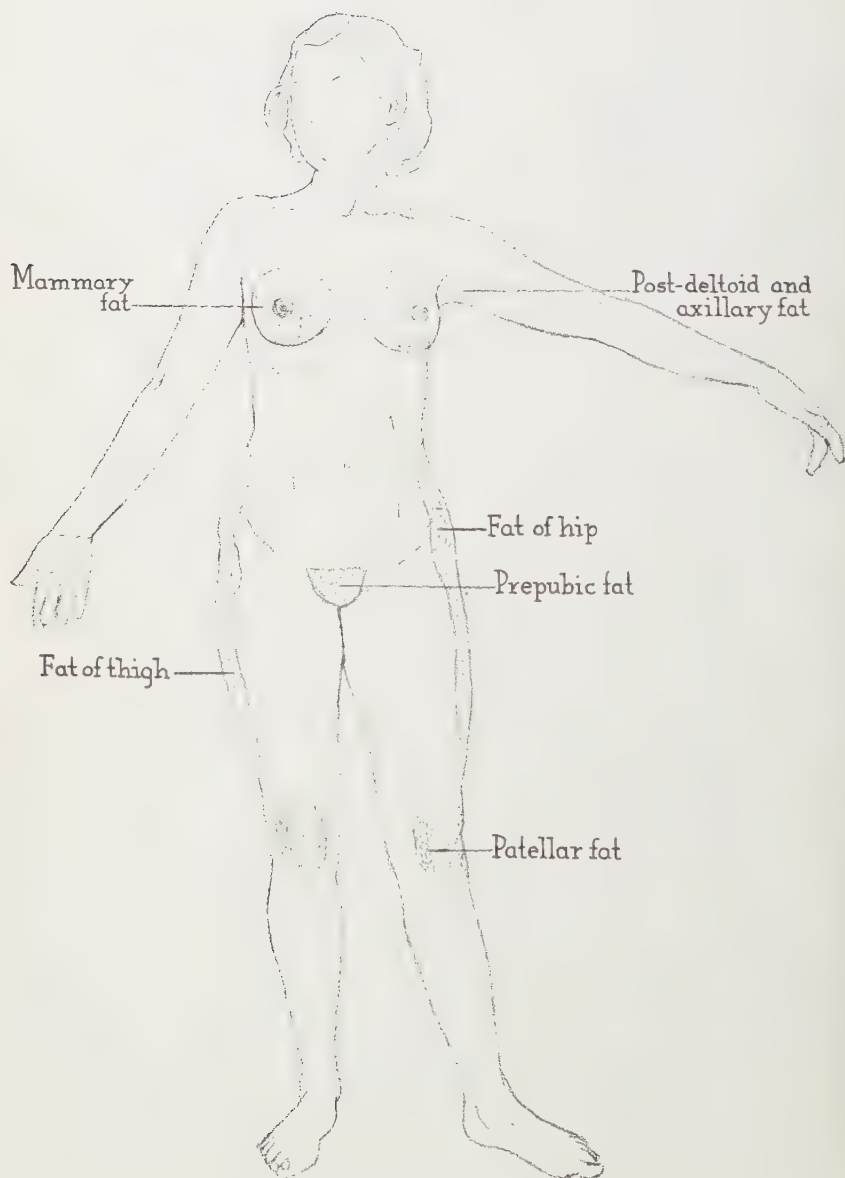


FIG. 112.—Fat distribution on female figure, anterior view.



FIG. 113.—Female figure, anterior view.

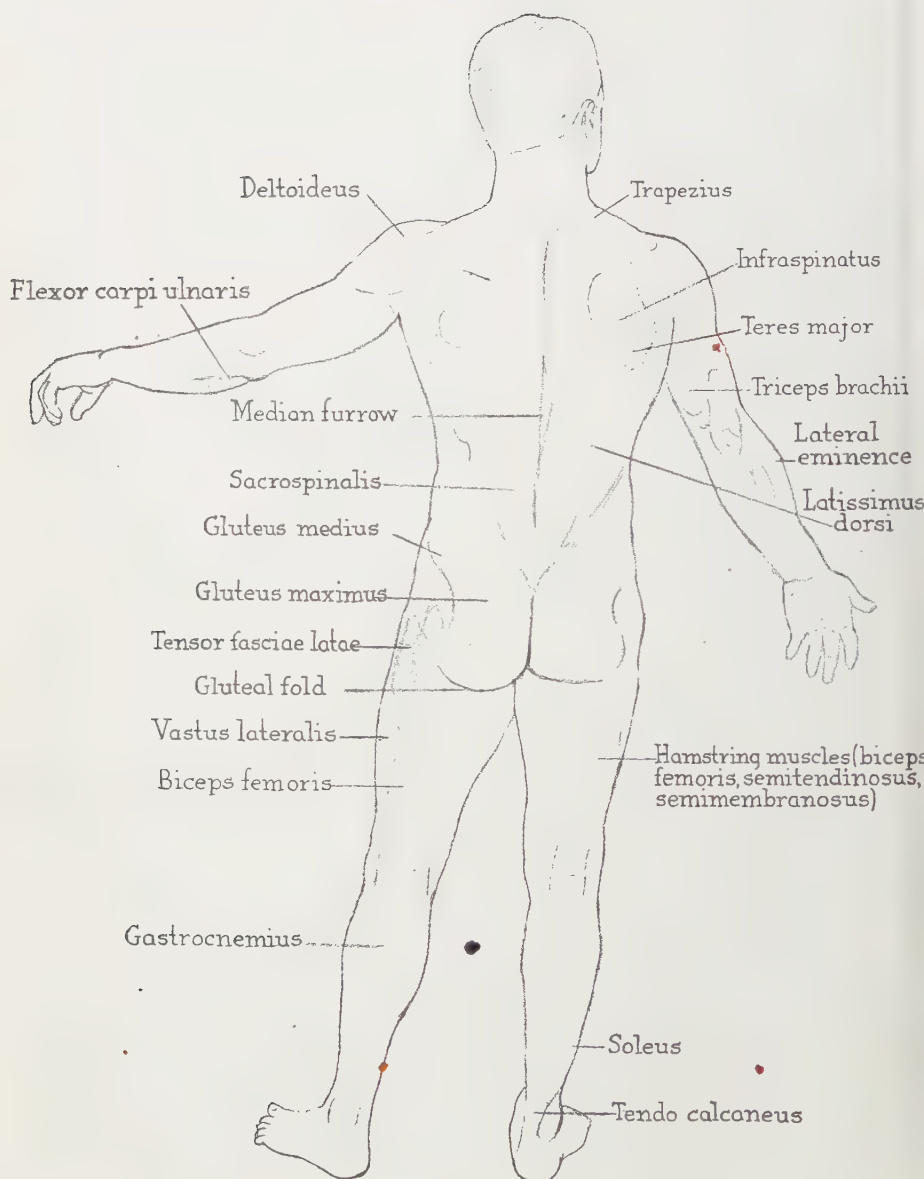


FIG. 114.—Key to muscular projections, posterior view.



FIG. 115.—Male figure, posterior view.

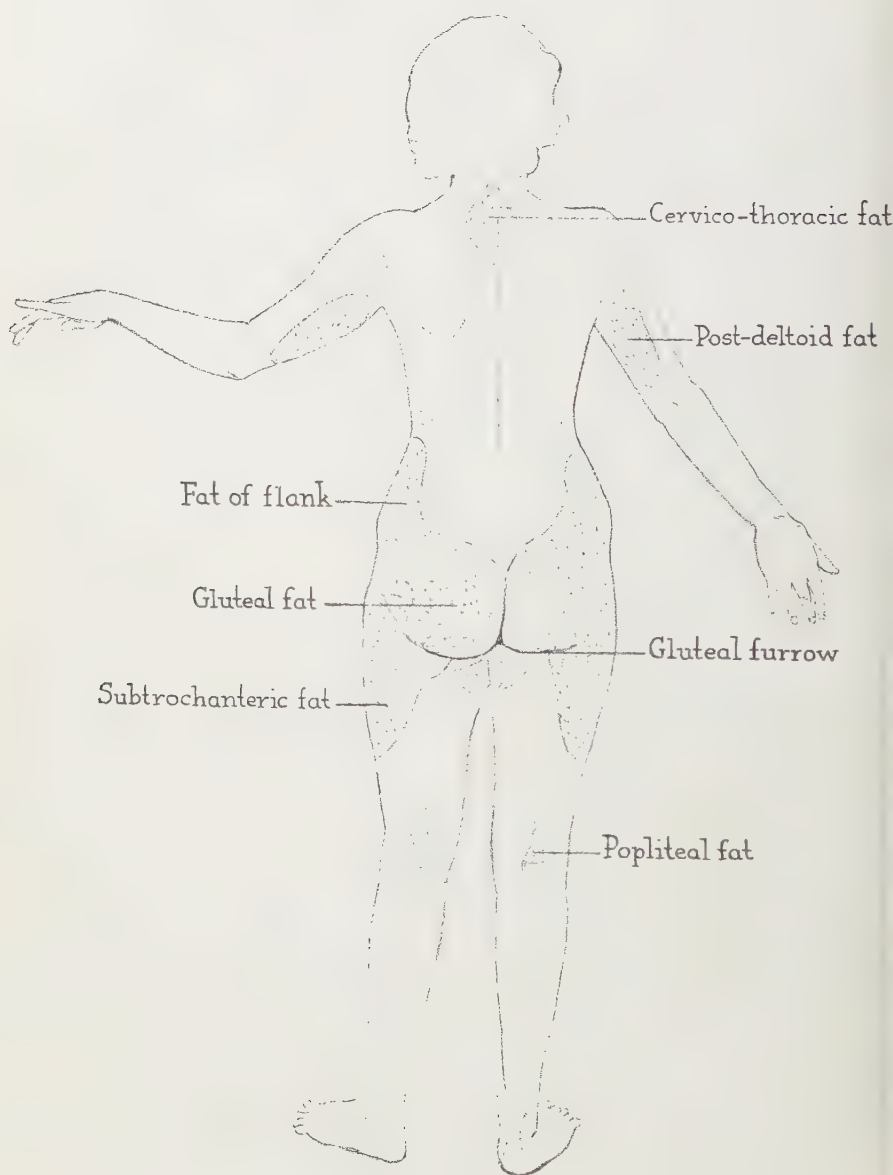


FIG. 116.—Fat distribution on female figure, posterior view.



FIG. 117.—Female figure, posterior view.

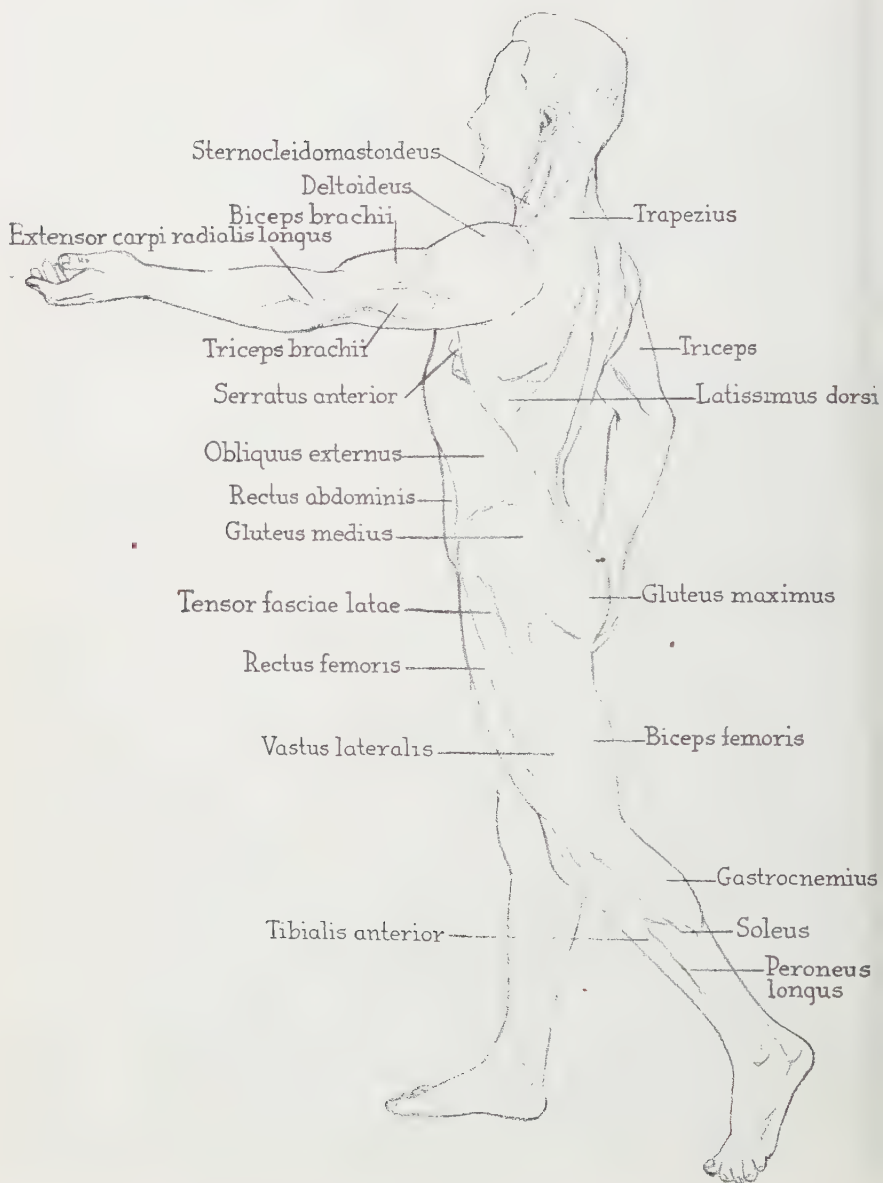


FIG. 118.—Key to muscular projections, left side view.



FIG. 119.—Male figure, viewed from the left side.

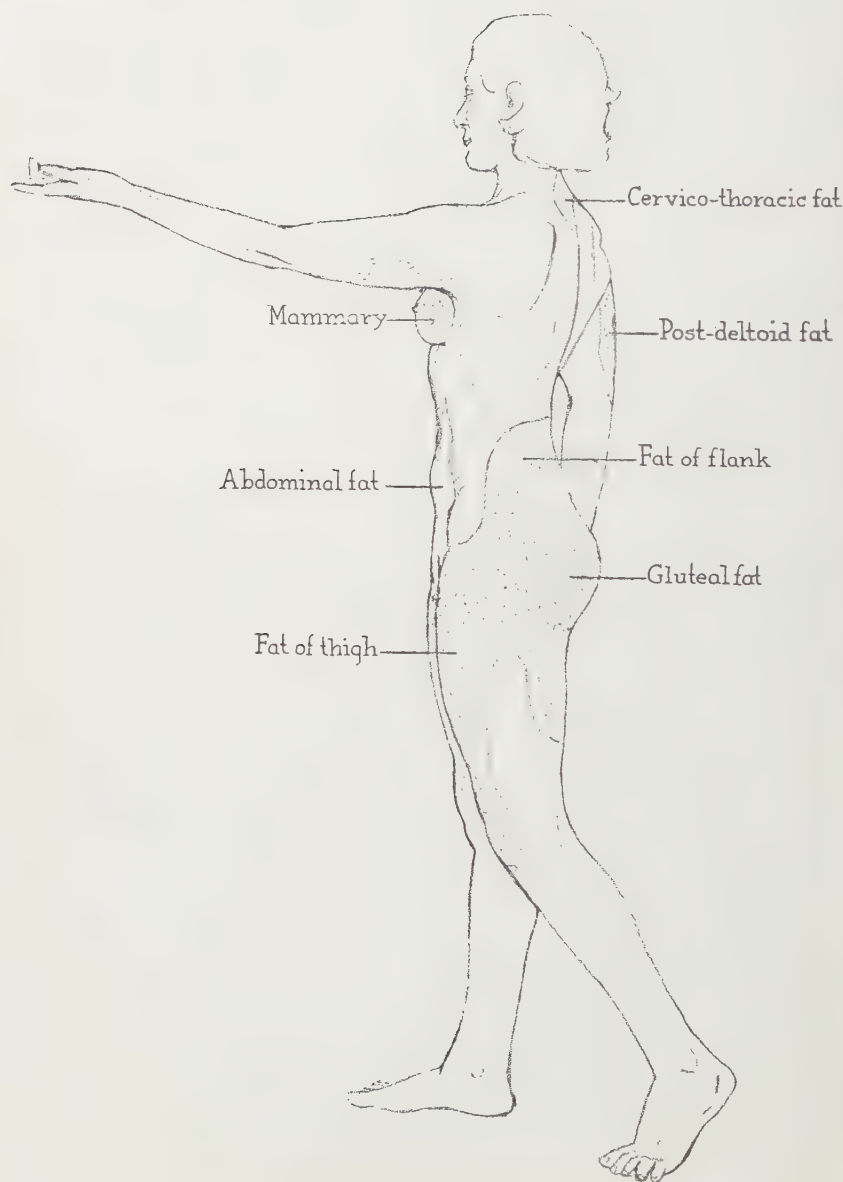


FIG. 120.—Fat distribution on female figure, lateral view.



FIG. 121.—Female figure, viewed from the left side.

CHAPTER XI

SURFACE ANATOMY OF THE CHILD

The child of nine years of age measures about six head-lengths.

In Fig. 122, observe the following structures, and compare with Fig. 111 of the adult male:

- Sternocleidomastoids.
- Latissimus dorsi.
- Rectus abdominis.
- Biceps brachii.
- Deltoideus.
- Rib cage outline.
- Inguinal (Poupart's) ligament.
- Waist lacking in child.

In Fig. 123, observe the following structures, and compare with Fig. 115 of the adult male:

- Trapezius.
- Latissimus dorsi.
- Deltoideus.
- Triceps.
- Median furrow of back.
- Vertebral border of scapula.
- Gluteal fold.
- Medial epicondyle of femur.
- Vertebral column curve to right to counter-balance weight of abducted left arm.

In Fig. 124, observe the following structures, and compare with Fig. 119 of the adult male:

- Deltoideus.
- Latissimus dorsi.
- Biceps brachii.
- Median spinal furrow.
- Vertebral column curvatures.
- Rib outline.
- Lateral malleolus of fibula.



FIG. 122.—Figure of a child, anterior view.



FIG. 123.—Figure of a child, posterior view.



FIG. 124.—Figure of a child, viewed from the left side.

CHAPTER XII

POSES OF THE MALE AND FEMALE FIGURE

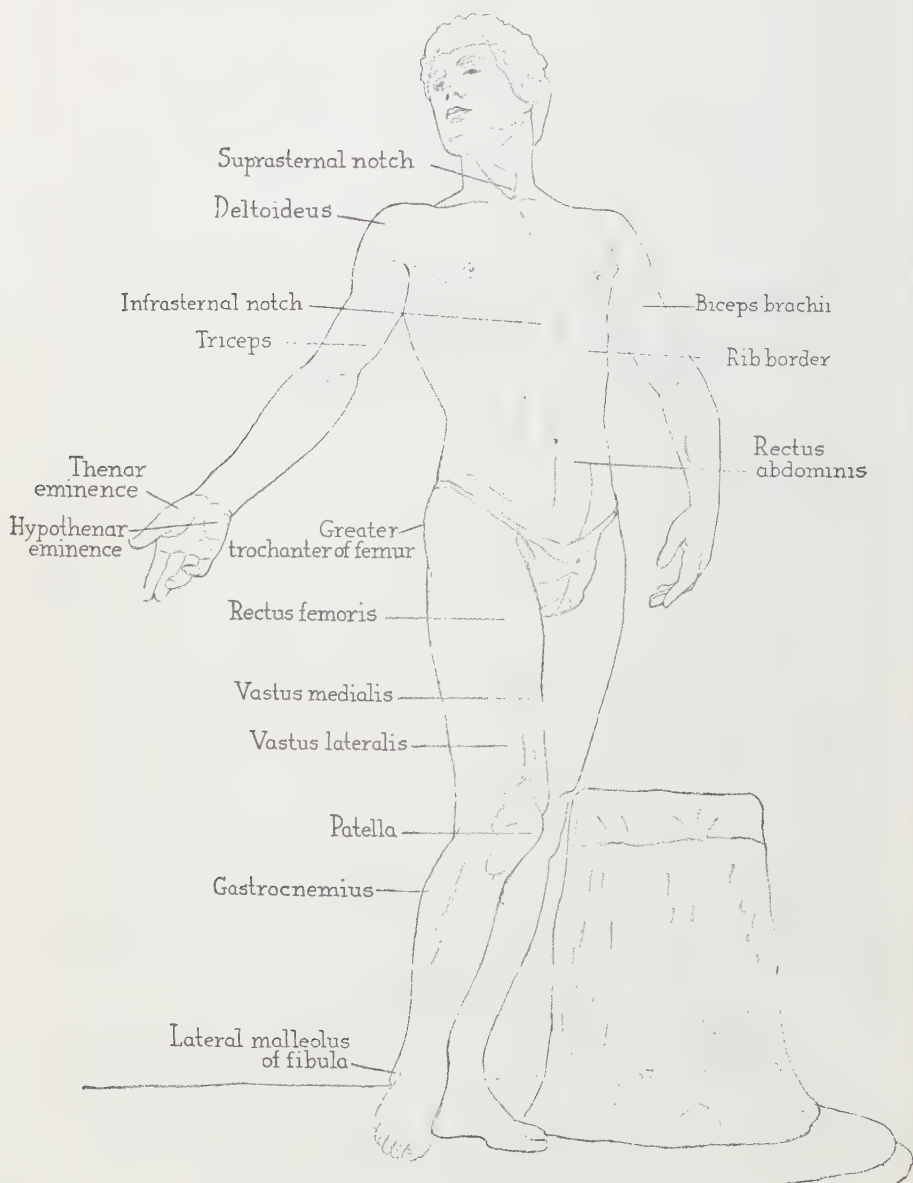


FIG. 125.—Surface anatomy, showing bony and muscular landmarks.



FIG. 126.—Ted Shawn, from his dance, "Death of Adonis."



FIG. 127.—Identify and label the muscles in the above key figure.



FIG. 128.—Ted Shawn, from his dance, "Death of Adonis."

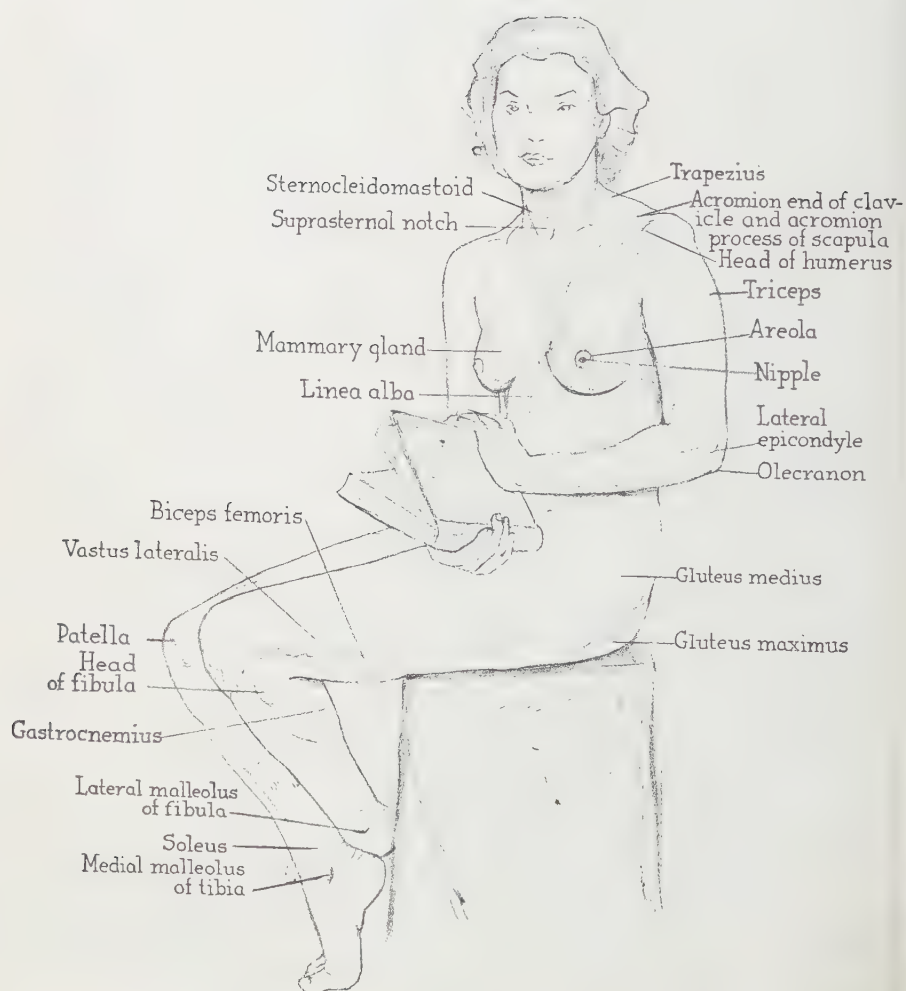


FIG. 129.—Surface anatomy, showing bony and muscular landmarks.



FIG. 130.—Girl seated.

THE MAMMARY GLAND

The **mammary gland** or **breast** is rudimentary in the male. In the female the gland remains undeveloped from the first year (infancy) up to the fourteenth year (puberty), when it increases in size, for a time, due to greater blood supply and accumulation of fat.

The gland measures about one-half inch in diameter at puberty and is increased to over four inches in the adult. The thickness of the adult mammary gland varies with the individual, depending upon conditions and the accumulation of fat, the average being two inches. The nipple is located in the fourth interspace usually and its circular area of pigmented skin, the *areola*, is pinkish-red, turning dark red during and after child-birth.

In Fig. 131, observe the right gland is located between the second and sixth ribs from the sternum to the anterior border of the axilla (armpit), lying chiefly on the pectoralis major muscle, and somewhat on the serratus anterior and rectus abdominis. The left gland is lower due to the position of the arm and trunk. Observe also the following structures:

Sternocleidomastoids.

Laryngeal prominence (Adam's apple) due to thyroid cartilage.

Pectoralis major insertion (left side).

Anterior superior spine of ilium.

Peroneus longus tendon.



FIG. 131.—Dancing pose.

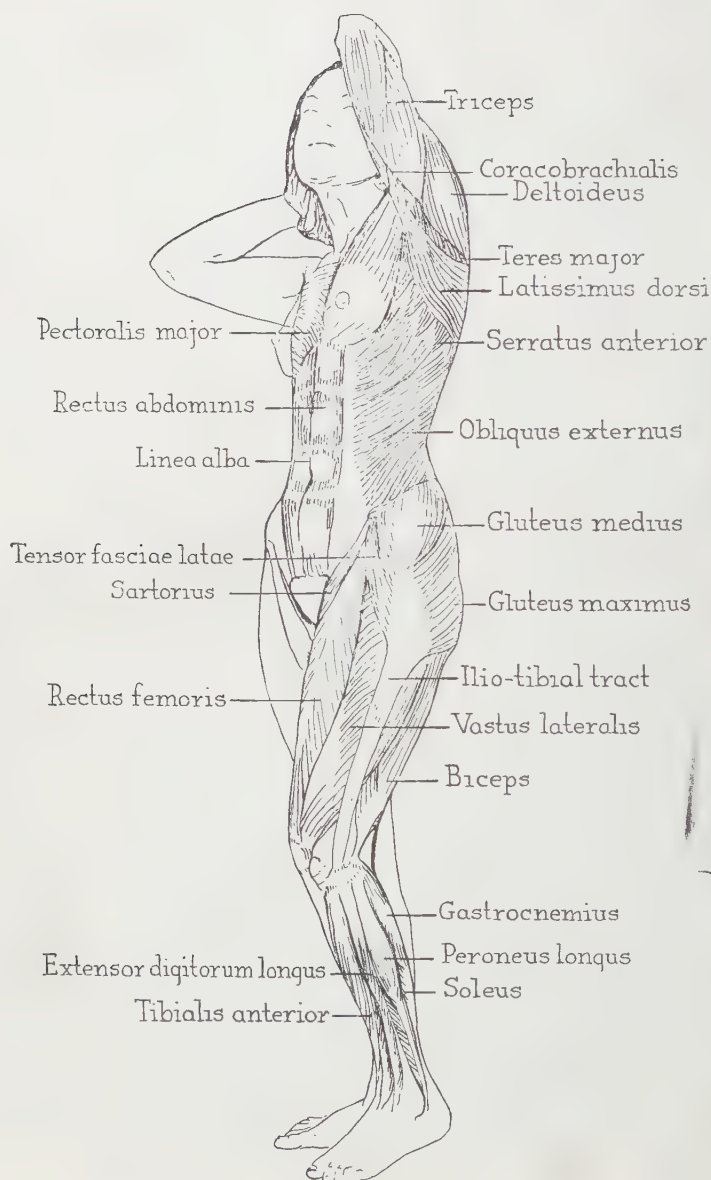


FIG. 132.—Girl standing showing labeled muscles.



FIG. 133.—Girl standing.

THE TENNIS PLAYER

Notice the general absence of muscular prominences, although this figure is in action. The condition is characteristic of the average female, the muscular prominences being covered by superficial fat. Observe also the altered shape of the breast, as well as the transverse creases on the side at the waist. The hollow evident on the front left elbow is known as the *Antecubital Fossa*.



FIG. 134.—Girl tennis player.

THE SPRINTER

In this figure practically every muscle is in action. It is well to note the following structures: the rounded and thick margin of the latissimus dorsi muscle, the contraction of the upper fibres of the deltoideus, the prominence due to the pectoral muscles, and the fan-like serratus anterior muscle. The muscles of the legs and the left arm are beautifully demonstrated. The hollow formed on the back of the knee-joint is known as the Popliteal Fossa. The convexity of the thoracic portion of the vertebral column is well-marked.



FIG. 135.—The sprinter.

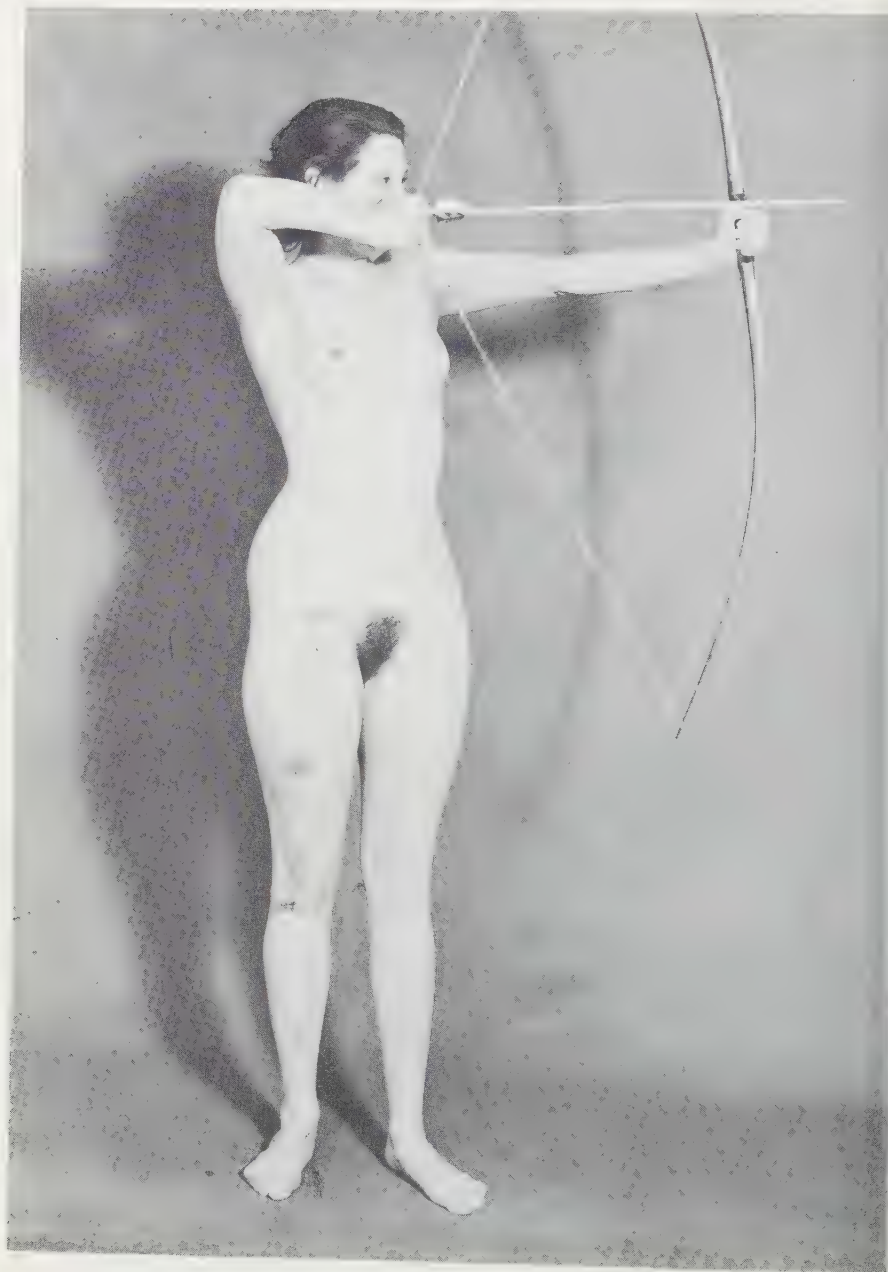


FIG. 136.—Girl archer.

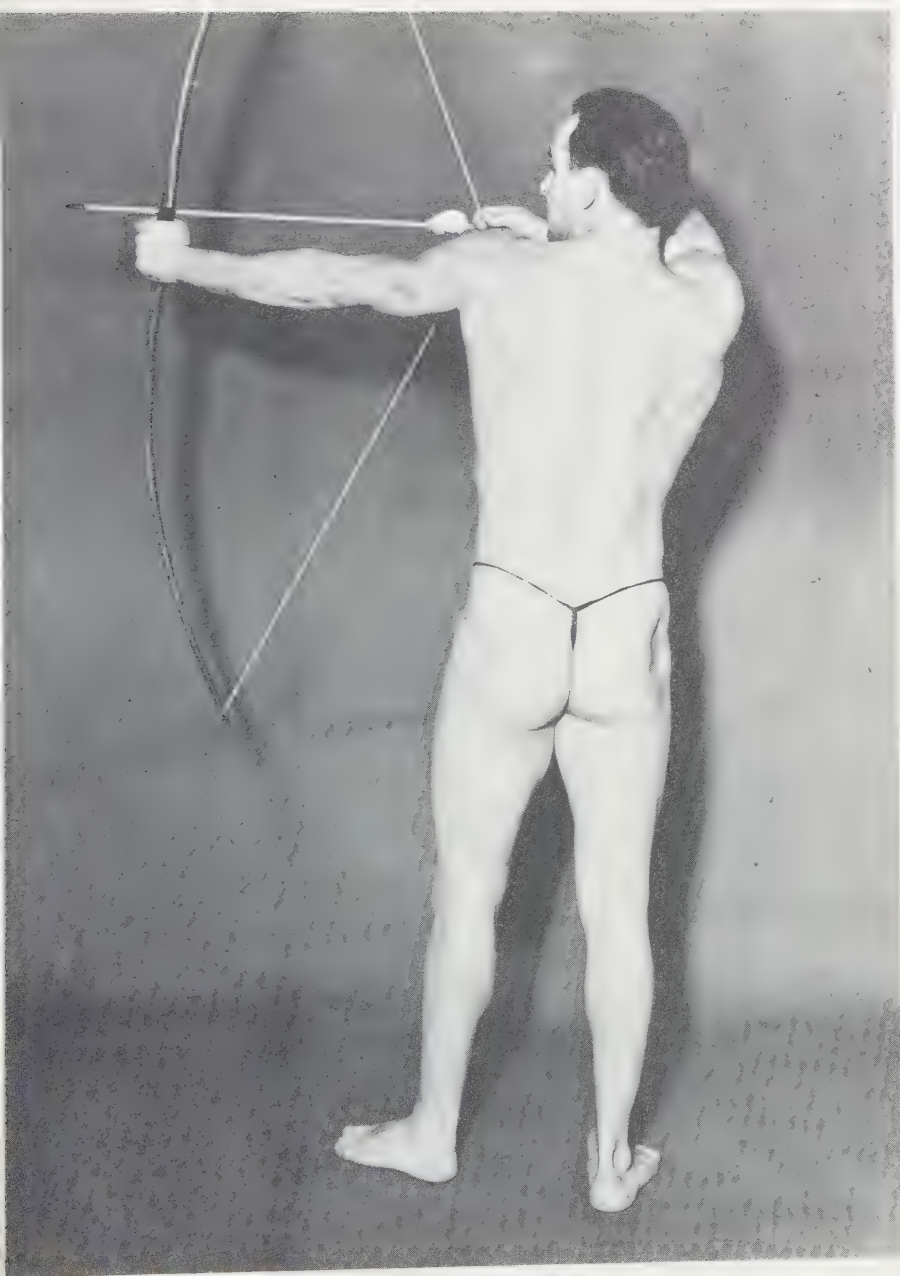


FIG. 137.—Male archer.



FIG. 138.—Label in the above sketch the anatomical structures evident in Figure 139. Make a memory sketch of the same figure.

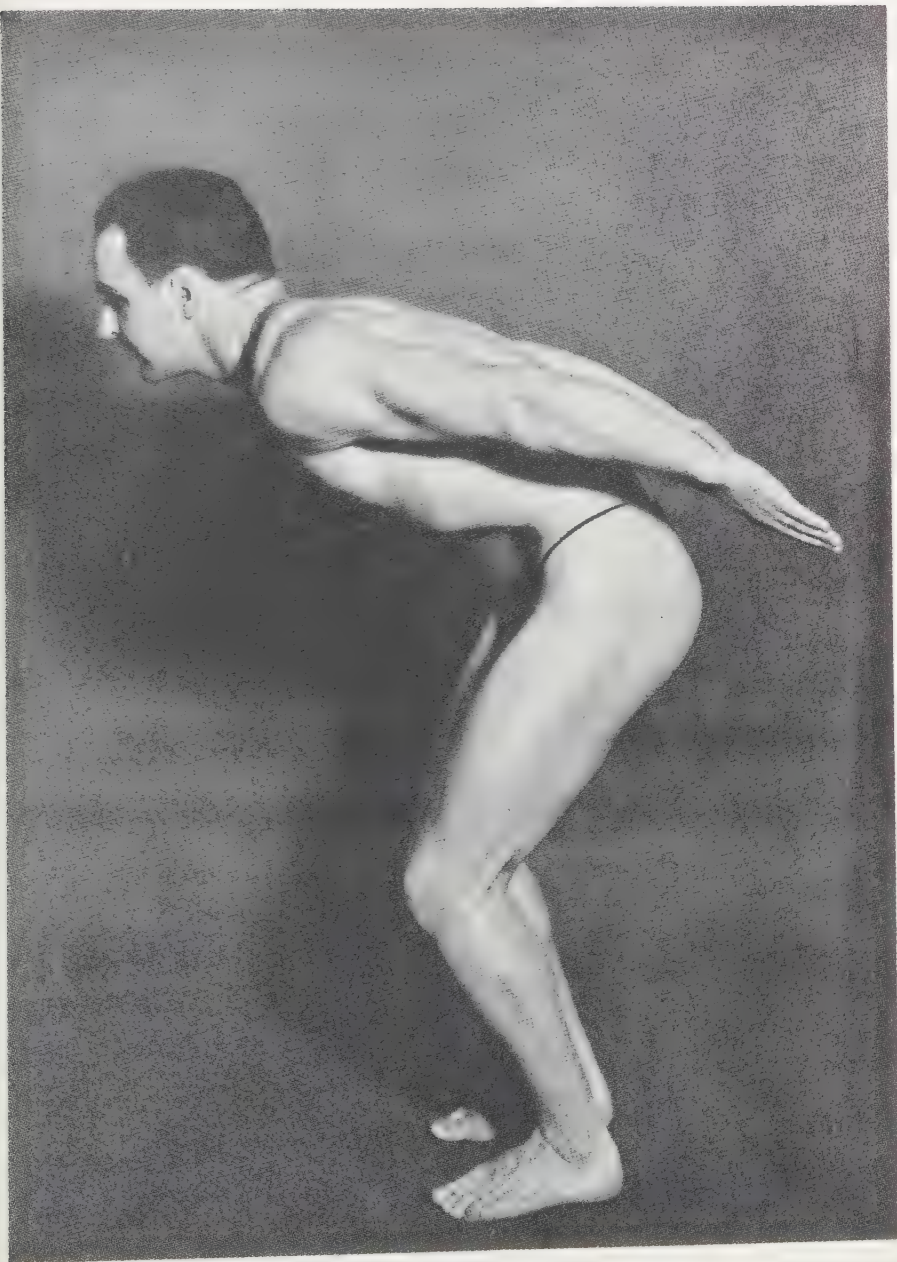


FIG. 139.—The diver.

CHAPTER XIII

ACTION PHOTOGRAPHS

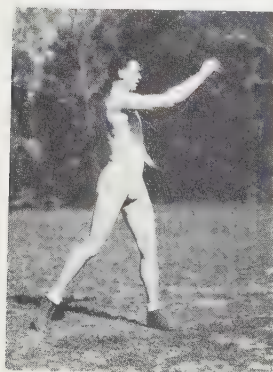


FIG. 140.—Football player showing action and form.

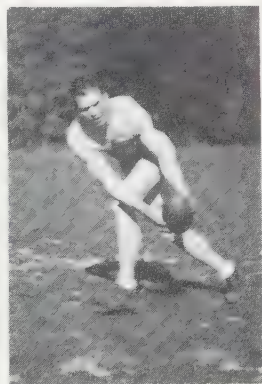


FIG. 141.—Football player showing balance, action, and form.

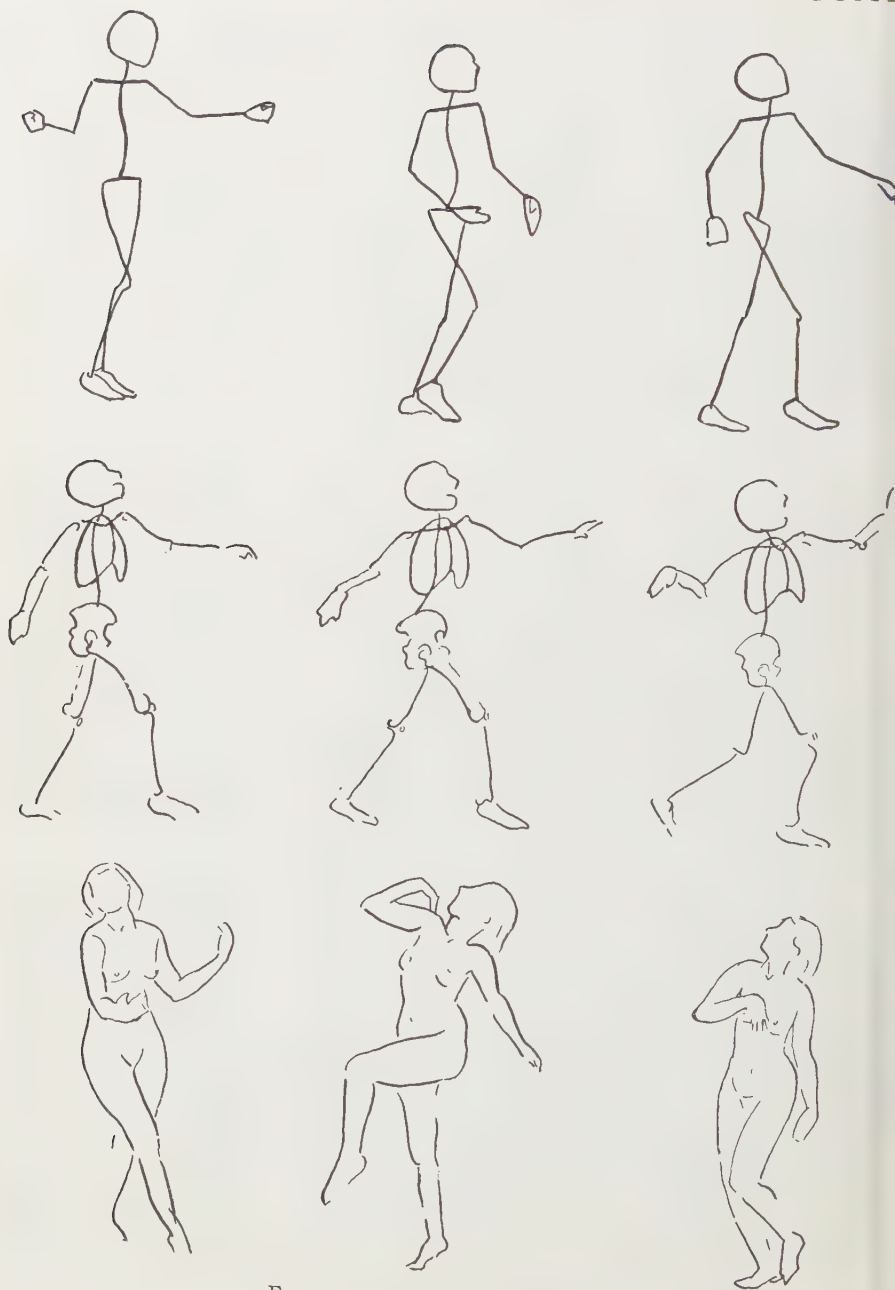


FIG. 142.—Action line sketches.



FIG. 143.—Female figure showing rhythm and form.

CHAPTER XIV

STUDENTS' DRAWINGS

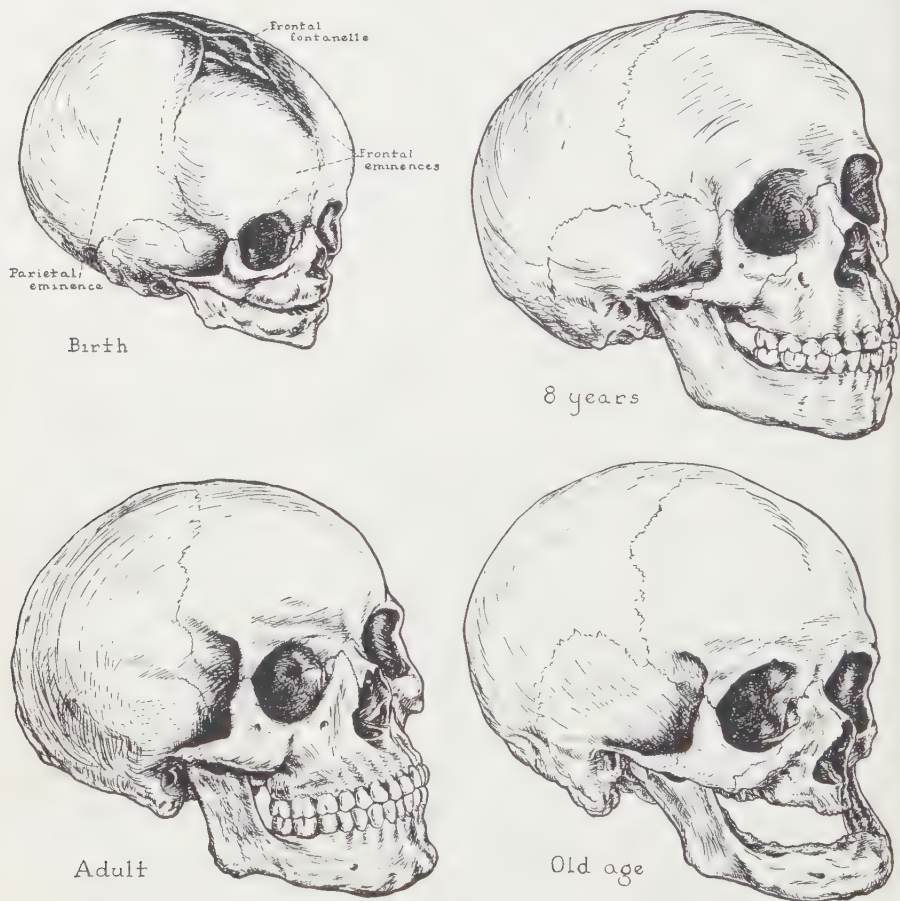


FIG. 144.—Skulls showing comparative age changes at birth, 8 years, adult and old age.

Differences in the Skull Due to Age. At birth the skull is large in proportion to the other parts of the skeleton. Its facial portion is small and is only about one-eighth of the bulk of the skull as compared with one-half in the adult. The parietal and frontal eminences are most prominent. The bones are unossified and membranous intervals termed fontanelles are usually visible at the angles of the bone. The frontal fontanelle is closed during the second year.

The smallness of the face at birth is accounted for mainly by the under-developed condition of the maxilla and mandible, the small size of the nasal cavity and the maxillary sinuses. With the eruption of the milk teeth at two months to two years of age, there is a growth of the face and jaws. These changes are more marked after the second dentition.

Growth of the skull is rapid until the seventh year, the orbital cavities being practically adult size; and at puberty the growth is again active, particularly in the facial and frontal regions, because of the developing air sinuses.

The old-age skull is characterized by diminution in the size of mandible and maxilla with loss of the teeth and absorption of the walls of the alveoli. The chin protrudes and the angle of the mandible tends to revert somewhat to the angle at birth. The vertical mass of the face appears reduced, due to increase in breadth of the skull and diminution of height, with slight increase of the slope of the frontal bone and flattening of the back of the head.

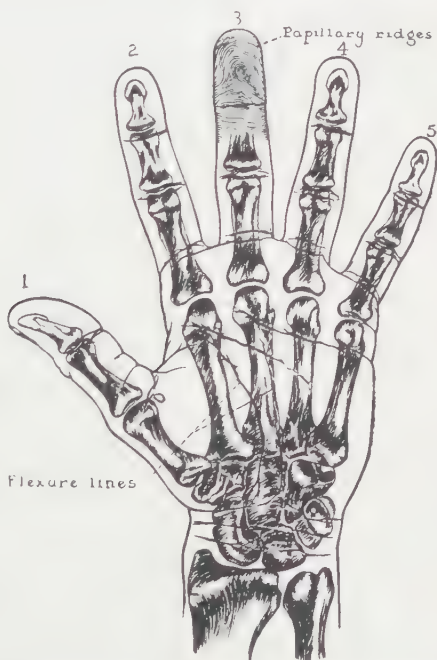


FIG. 145.—Showing the relation of the usual flexure lines to the bony elements of the hand, and arrangement of the papillary ridges on the third terminal phalanx.

The different fingers and toes display various lengths, measuring the relative projection of the tips of the digits from the extremity of the limb. Artists and anatomists describe the middle finger as the longest, and the ring or index fingers as commonly of equal length (i.e., $3 > 4 = 2$). The digital formula for the ideal type of hand is: $3 > 4 = 2 > 5 > 1$. The formula for the digits of the hand of specialization, highest in evolutionary scale, is: $3 > 2 > 4 > 5 > 1$. There are three types of digital formula of the human foot:

- A. Commonest type: $1 > 2 > 3 > 4 > 5$.
- B. "Greek" ideal type: $2 > 1 > 3 > 4 > 5$.
- C. Uncommon (or criminal) type: $3 > 2 > 1 > 4 > 5$.

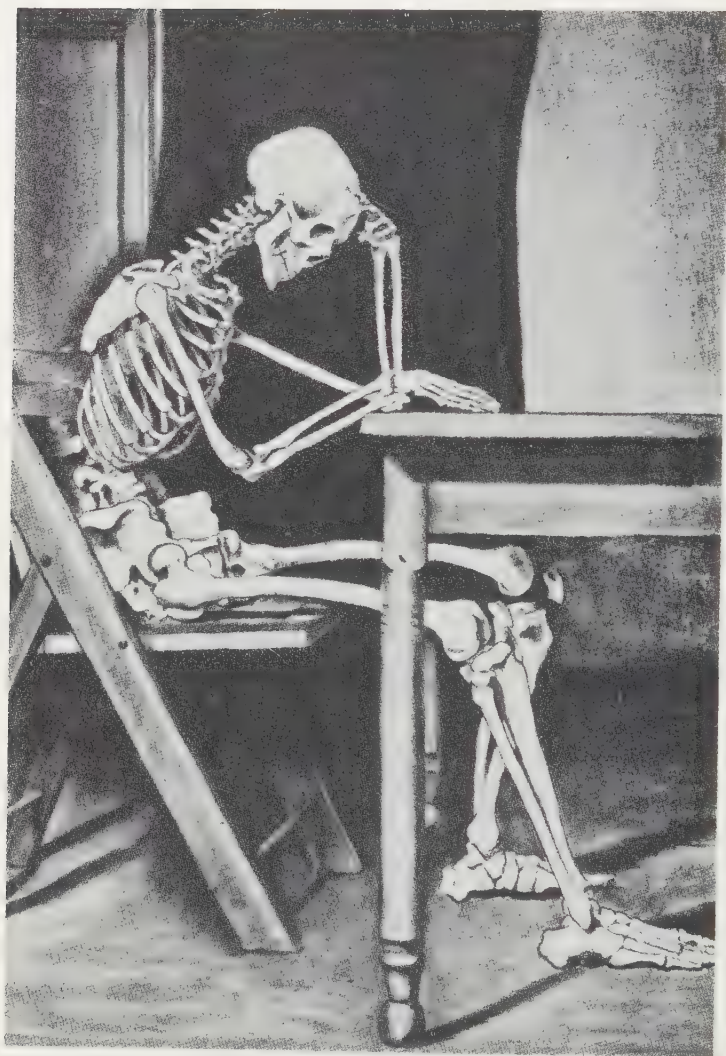


FIG. 146.—Posed Skeleton (student's drawing in competition).

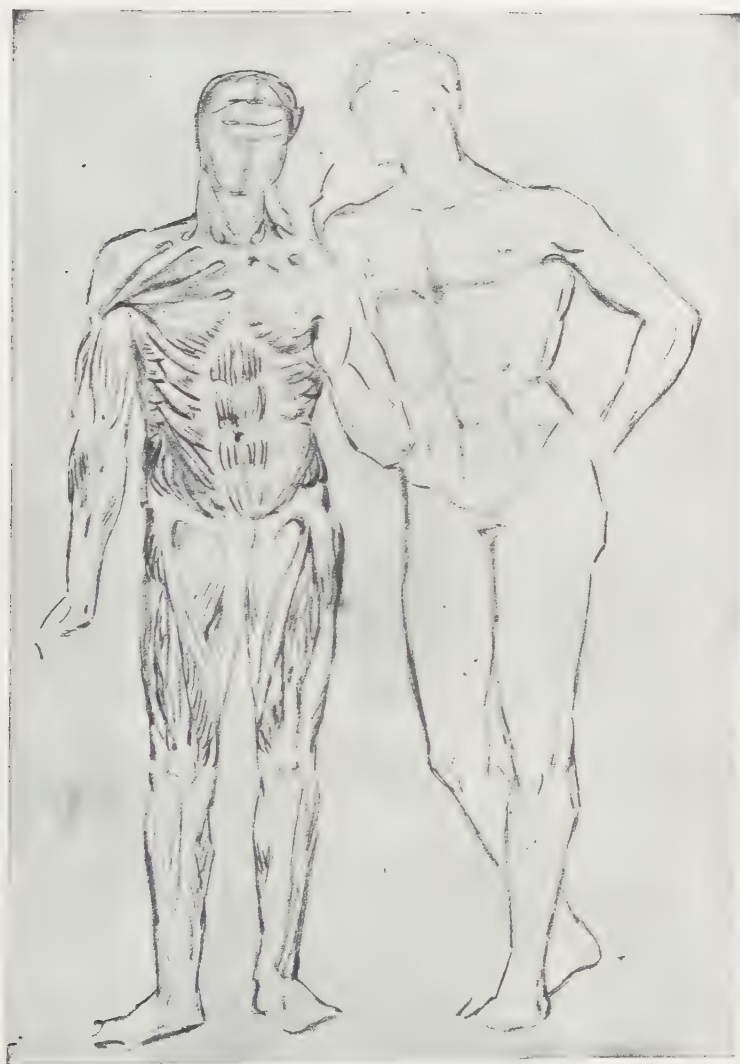
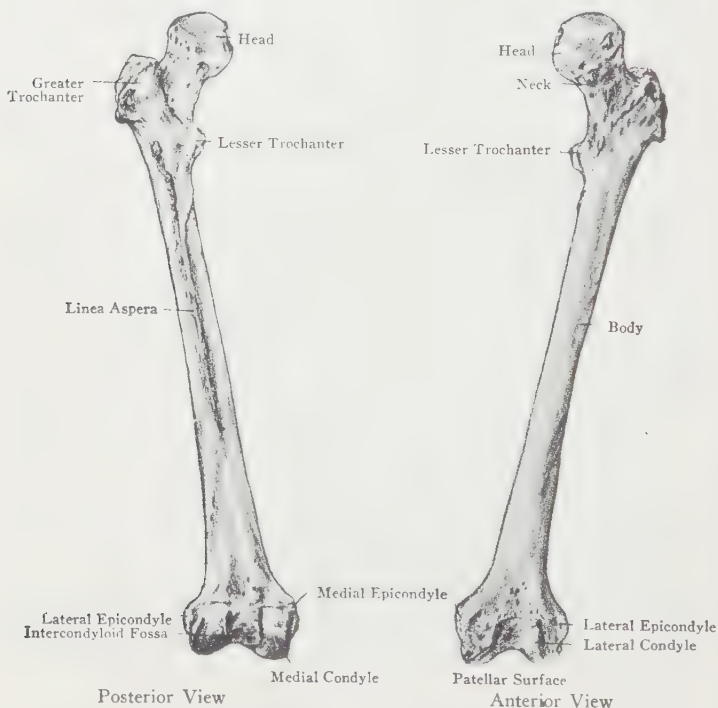
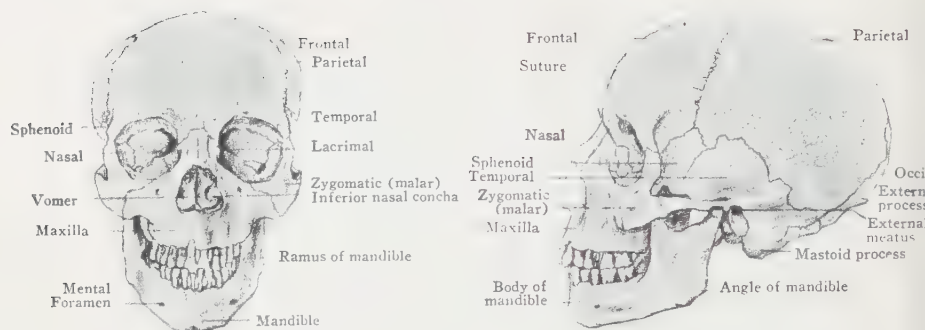
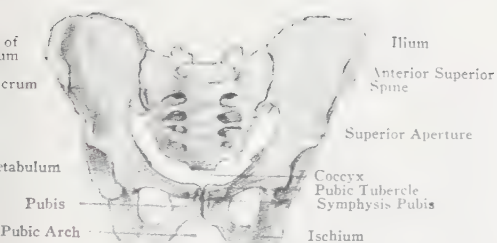


FIG. 147.—Student's sketch.

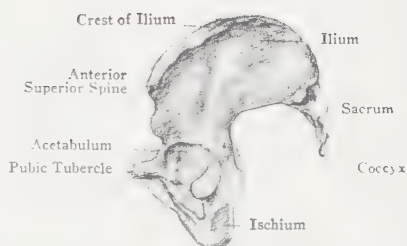


Left Thigh Bone, Femur

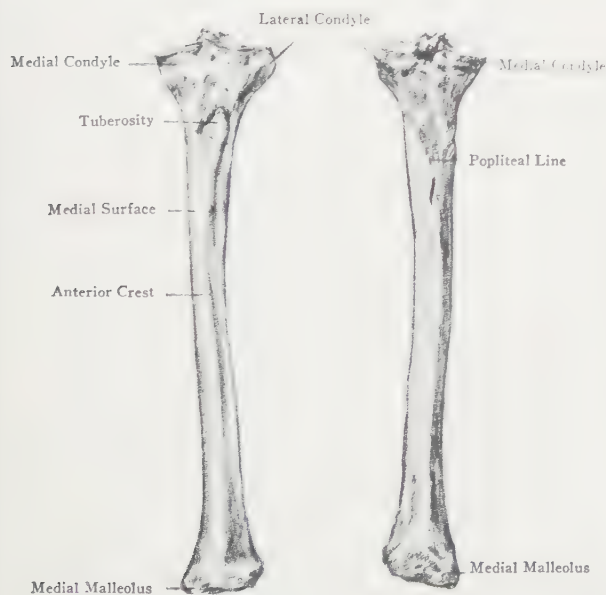
FIG 148.—Student's sketches of bones.



Male Pelvis—Anterior View



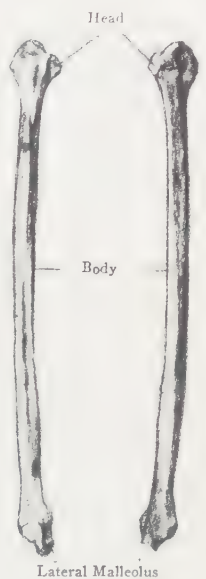
Female Pelvis—Left Side



Anterior View

Posterior View

Left Shin Bone, Tibia



Anterior View

Posterior View

Left Calf Bone, Fibula

FIG. 149.—Student's sketches of bones.

CHAPTER XV

GLOSSARY OF ANATOMICAL WORDS AND COMMON MEANING

TERMS INDICATING THE SITE AND DIRECTION OF THE PARTS OF THE BODY

WORD	MEANING
Anterior	in front
Caudal	towards tail
Cranial	towards head
Dorsal	back
External	outside of
Frontal	in front
Inferior	lower
Internal	inner side
Lateral	to side
Medial	middle
Posterior	behind
Profundus	deep
Superficial	above the form (near the surface)
Superior	above
Ventral	in front
Vertex	top

TERMS SPECIALLY USED FOR THE EXTREMITIES

Distal	distant
Proximal	nearest the origin

TERMS SPECIALLY USED IN MOVEMENTS OF PARTS

Abduction	draw away
Adduction	bring toward
Circumduction	draw around
Depression	press down
Elevation	lift up
Eversion	twist about
Extension	stretch out
Flexion	bend
Inversion	turn about
Pronation	turn face down
Protraction	draw forth
Retraction	draw back
Rotation	wheel around, revolve
Supination	turn face up

BONES

WORD	PRONUNCIATION	MEANING
Acromion	ak-ro'me-on	tip of shoulder
Astragalus	as-trag'al-us	ankle bone
Calcaneus	kal-ka'ne-us	heel bone
Capitate	kap'it-āt	head
Carpus	kar'pus	wrist
Cervical	ser'vik-al	neck
Clavicle	klav'ik-l	key, collar bone
Coccyx	kok'siks	tail bone
Concha	kong'kah	shell
Coracoid	kor'ak-oid	like crow's beak
Coronoid	kor'o-noid	crow's beak
Corpus	kor'pus	body
Costa	kos'tah	rib, side
Coxa	koks'ah	hip
Cuboid	ku'boid	cube
Cuneiform	ku'ne-if-orm	wedge-shaped
Digit	dij'it	finger
Ethmoid	eth'moid	sieve-like
Femur	fe'mur	thigh bone
Fibula	fib'u-lah	brace bone, root and clasp
Glenoid	gle'noid	socket
Hamate	ha'māt	hooked
Humerus	hu'mer-us	arm bone
Hyoid	hi-oid	u-shaped bone
Ilium	il'e-um	hip, haunch bone
Incus	ing'kus	anvil
Innominate	in-om'in-at	unnamed
Ischium	is'ke-um	hip bone
Lacrima	lak'rim-al	tear
Lumbar	lum'bar	loin
lunar	lu'nar	moon shaped
Malar	ma'lar	cheek
Malleus	mal'e-us	hammer, to strike
Mandible	man'dib-l	lower jaw
Manubrium	man-u'bre-um	handle
Mastoid	mas'toid	breast
Maxillary	mak'sil-a-re	jawbone
Metacarpal	met-ah-kar'pal	beyond the wrist
Metatarsal	met-ah-tar'sal	beyond the instep
Multangular	mult-ang'u-lar	many angles
Nasal	na'zal	nose
Navicular	na-vik'u-lar	boat-shaped
Occipital	ok-sip'it-al	base of head
Olecranon	o-lek'ran-on	process of ulna at elbow
Palate	pal'at	palate, roof of mouth
Parietal	par-i'et-al	wall
Patella	pat-el'ah	knee pan, pan
Pelvis	pel'vis	basis

WORD	PRONUNCIATION	MEANING
Phalanges	fa-lan'jez	line of soldiers
Pisiform	pi'sif-orm	pea-shaped
Pubis	pu'bis	pubic bone, hair
Radius	ra'de-us	spoke or ray (of wheel)
Sacrum	sa'krum	holy bone, sacred or cursed
Scaphoid	ska'foid	boat-shaped, like a skiff
Scapula	skap'u-lah	spade, shoulder blade
Semilunar	sem-e-lu'nar	half-moon
Sphenoid	sfe'noid	wedge-shaped
Stapes	sta'pēz	stirrup
Sternum	ster'num	flat, breast bone
Talus	ta'lus	one of a set of dice, ankle bone
Tarsus	tahr'sus	instep
Temporal	tem'por-al	time, temple
Thorax	tho'raks	chest, cage
Tibia	tib'e-ah	shin bone, flute
Trapezoid	trap'ez-oid	table, square wrist bone
Triquetrum	tri-kwe'trum	triangular
Ulna	ul'nah	elbow
Vertebra	ver'te-brah	to turn, spindle bone
Vomer	vo'mer	ploughshare
Xiphoid	zi'foid	like a sword
Zygomatic	zi-go-mat'ik	cheek

MUSCLES

WORD	PRONUNCIATION	MEANING
Abductor	ab-duk'tor	leader away
pollicis	pol'licis	of the thumb
longus	long'us	long
pedis	pe'dis	foot
hallucis	hallu'cis	of the great toe
digiti	dig'iti	fingers
quinti	quin'ti	fifth
Achilles tendon	ak-il'ez	a Greek warrior who was vulnerable only in the heel
Adductor	ad-uk'tor	leader to
magnus	mag'nus	great
minimus	min'imus	little
Anconeus	an-ko'ne-us	pertaining to the elbow
Biceps	bi'seps	double headed
brachii	bra'chii	pertaining to the arm
femoris	fem'oris	thigh
Brachialis	bra-ke-a'lis	pertaining to the arm
Brachioradialis	brak'e-o-ra-de-a'lis	arm to radius
Buccinator	buk'sin-a-tor	trumpeter's muscle
Caninus	ka-ni'nus	sharp pointed (dog)

WORD

PRONUNCIATION

MEANING

Coraco	kor'ak-o	beak-like
Deltoid	del'toid	like Greek letter Delta (Δ)
Digastricus	di-gas'trik-us	double bellied
Epicranius	ep-ik-ra'ne-us	
epi		upon
cranium		head
Extensor	ex-ten'sor	extender
communis	commu'nis	common
carpi	car'pi	wrist
ulnaris	ulna'ris	pertaining to ulna
proprius	pro'prius	proper
indicis	in'dicis	first finger
Flexor	fleks'or	bender
profundus	profun'dus	deep
sublimis	subli'mis	superficial
Gastrocnemius	gas-trok-ne'me-us	
gastro		belly
nemius		leg
Gluteus	glu-te'us	buttocks
maximus	max'imus	greatest
medius	me'dius	middle
minimus	min'imus	lesser
Gracilis	gras'il-is	slender
Iliacus	il-i'ak-us	pertaining to the iliac bone
Infraspinatus	in'frah-spi-na'tus	
infra		below
spinatus		spine
Intercostal	in-ter-kos'tal	between the ribs
externus		outside, or external
internus		inside, or internal
Latissimus	lat-is'im-us	broadest
dorsi	dor'si	back
Levator	le-va'tor	lifter
labii	la'bii	lips
menti	men'ti	chin
Longissimus	lon-jis'im-us	longest
Longus	long'us	long
colli	col'li	neck
Lumbricalis	lum-brik-a'lis	worm-shaped
Masseter	mas-e'ter	chewer
Mylohyoid	mi-lo-hi'oid	pertaining to lower jaw teeth and hyoid bone
Obliquus	ob-li'kwus	oblique
abdominis	abdom'inis	abdomen
capitis	cap'itis	head
Obturator	ob'tu-ra-tor	stopper

WORD	PRONUNCIATION	MEANING
Opponens	op-o'nenz	opposing
Orbicularis	or'bik-u-la'ris	circular
oris	o'ris	mouth
oculi	oc'uli	eye
Palmaris	pal-ma'ris	palmar
Pectineus	pek-tin'e-us	pertaining to attachment on pubic bone
Pectoralis	pek-to-ra'lis	pertaining to the breast
major	ma'jor	greater
minor	mi'nor	lesser
Peroneus	per-o-ne'us	fibular (pin)
tertius	ter'tius	third
Plantaris	plan-ta'ris	pertaining to the sole of foot
Platysma	pla-tiz'mah	the muscle-like expansion
Popliteus	pop-lit-e'us	posterior surface of knee (hamstring muscles)
Pronator	pro-na'tor	turner down
quadratus	quadra'tus	square
teres	te'res	round
Psoas	so'as	loin
Piriformis	pir-if-or'mis	pear-shaped
Rectus	rek'tus	straight
femoris	fem'oris	thigh
Rhomboideus	rom-boid'e-us	quadrilateral
Risorius	ri-so're-us	laughing muscle
Sacrospinalis	sa''kro-spi-na'lis	attached from sacrum along spine
Sartorius	sar-to're-us	tailor's muscle, used in crossing legs
Scalenus	ska-le'nus	irregular, triangular, uneven
Semimembranosus	sem'e-mem-bran-o'sus	half membranous
Semitendinosus	sem'e-ten-din-o'sus	half tendinous
Semispinalis	sem'e-spi-na'lis	attached to one-half of spine
Serratus	ser-a'tus	toothed
Soleus	so'le-us	sandal, pertaining to the sole
Splenius	sple'ne-us	bandage
Sternocleidomastoid	ster''no-kli-do-mas'toid	
sterno		sternum
cleido		clavicle
mastoid		mastoid process of temporal bone
Subclavius	sub-kla've-us	
sub		below
clavius		clavicle
Subscapular	sub-skap'u-lar	below scapular spine
Supinator	su-pin-a'tor	lying on the back
Temporalis	tem-por-a'lis	time, the first place gray hair appears (temple)
Thenar	the'nar	palm
hypo		less than

WORD

PRONUNCIATION

MEANING

Tibialis

tib-e-a'lis

attached to tibia

Trapezius

trap-e'ze-us

table-like

Triceps

tri'seps

three-headed

Vastus

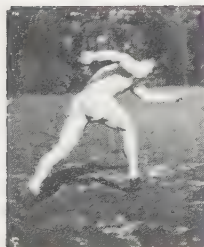
vas'tus

large

Zygomaticus

zi-go-mat'ik-us

pertaining to cheek



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ART STUDENTS' ANATOMY, E. J. Farris. Outstanding art anatomy that uses chiefly living objects for its illustrations. 71 photos of undraped men, women, children are accompanied by carefully labeled matching sketches to illustrate the skeletal system, articulations and movements, bony landmarks, the muscular system, skin, fasciae, fat, etc. 9 x-ray photos show movement of joints. Undraped models are shown in such actions as serving in tennis, drawing a bow in archery, playing football, dancing, preparing to spring and to dive. Also discussed and illustrated are proportions, age and sex differences, the anatomy of the smile, etc. 8 plates by the great early 18th century anatomic illustrator Siegfried Albinus are also included. Glossary. 158 figures, 7 in color. x + 159pp. 5½ x 8½. T744 Paperbound **\$1.50**

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